

Collective action for territorial quality differentiation of cheese in mountain areas: *Case studies of the Campos de Cima da Serra in Brazil and the Province of Trento in Italy*

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Summary

Globalization leads to development inequalities between the so-called favorable and marginal rural areas. On a generic market, the latter can hardly compete with favorable rural areas because they are generally less endowed with production factors, located far from the markets and often have poorly developed infrastructures and unfavorable natural conditions for production-oriented agriculture. To avoid price competition some marginal rural areas demonstrate capacity to redefine their development paths through endogenous development. This model relies on local resources to offer specific products and services. The present research focuses on cheese agrifood systems in mountain rural areas. Due to the strong symbolic dimension of such systems on the one hand, and the central role of collective organization on the other hand, the territorial approach developed in French-speaking literature seems valuable for the research. In particular, the concept of Localized Agrifood Systems (LAS) appears to be interesting. LAS corresponds to agrifood systems anchored in specific territories, defined as socially constructed, culturally marketed, and institutionally regulated spaces. They rely on territorial quality differentiation of food products, as an alternative to standardized production. This process mobilizes both material attributes related to intrinsic qualities of the product and symbolic attributes linked to the geographical origin. Territorial governance, which means coordination among heterogeneous local actors, ensures the process of differentiation and the construction of cheese reputation. At the same time, this process requires a specific demand related to a higher willingness to pay from consumers. These are the conditions needed to enable a process of territorial development, as it should result in a higher price and a fairer profit distribution and, therefore, in higher incomes and satisfaction of the local needs. In addition, territorial development considers further social, cultural and environmental dimensions.

The differentiation process relies on the creativity of the local actors and offers a potential for self-organization, which depends on the ability of these actors to cooperate and to act collectively. The general aim of this research is to analyze how actors in mountain cheese LAS act collectively for the territorial quality differentiation of the cheese. It encompasses three specific objectives described as follows: i) to analyze the territorial governance structures and the collective strategies implemented to differentiate mountain cheese, ii) to analyze relational processes within a collective organization to understand what is decisive in achieving collective action, iii) to link producers' representations of identity and the feeling of belonging to territory

to their degree of involvement in collective action. In return, it is to define how these LAS can respond to the challenge of territorial development.

The framework of Common Pool Resources (CPRs), territorial proximity and territoriality are employed and connected in this thesis to grasp the relationships between collective action and territory in LAS. First, the CPR framework is used to investigate the normative and multilevel institutional dimensions of collective action, and therefore the governance structures. In fact, this framework allows considering the capacity of self-organization of the local actors through the design of localized institutional arrangements and the establishment of shared norms. At the same time, it also includes the role of governments in potentially supporting localized collective action. Second, the territorial proximity approach is used to integrate the geographical and organized relationships into the analysis. Lastly, the territoriality approach considers the role of identity and feeling of belonging in collective action.

This thesis applies both qualitative (e.g. semi-structured interviews, in-depth interviews with key actors, “farm biographies”) and quantitative (e.g. social network analysis, statistics) methods. This research is conducted in two different case studies. The first study area is located in the Campos de Cima da Serra in southern Brazil, where the Serrano cheese is produced. It is a traditional raw milk cheese; however, it is an informal production due to new consumers’ preferences for young instead of matured cheese and difficulties of compliance with hygiene standards. Moreover, production is still poorly organized and the first forms of collective action recently emerged in the 2000s. The second study area is located in the province of Trento, in the Italian Alps. Cheese production is strongly organized by the producers, who are grouped in dairy cooperatives which process milk into different typical cheeses. The cooperatives are associated to a consortium that organizes the cheese production at the province level.

Results show that a mixed form of governance, i.e. including local public and private actors, as found in the province of Trento, seems crucial for the success of collective action for cheese differentiation. Whereas a top-down model, i.e. with a predominance of public actors in the coordination, as found in the Campos de Cima da Serra, leads to a low participation of producers in collective action. In order to enhance cheese reputation, the local actors concerned must create exclusion mechanisms by designing their own rules, which include sanction mechanisms, and by defining a pertinent geographical area of production. Most of the time, these rules correspond to specifications in geographical indications. Nonetheless, the success of local collective action also depends on governments and on the implementation of public

policies that aim at supporting and valorizing the production. In addition, agritourism plays an important role in differentiation. Regarding the relational structure within collective organizations, the success of collective action relies on a high degree of organizational trust and reciprocity, which are conditioned by geographic and organized proximity. Indeed, geographical proximity, facilitated by village grouping, professional meetings and cultural events, allows increasing face to face interactions and therefore trust. However, the mountain environment can exacerbate isolation, leading to less participation in collective action. The presence of transport and communication infrastructures is therefore necessary to reduce isolation. Moreover, the absence of hierarchy regarding the socioeconomic status among producers, the presence of prestige-based leaders, as well as the resolution of conflicts through the definition of rules seem important for collective action achievement. Finally, producers' representations of identity reflect their participation in collective action. It therefore seems important to stimulate discussion between the different producers, in order to create common representations conducive to collective action, where the feeling of belonging may be an important element to provide higher commitment. In return, LAS participate in territorial development, which includes economic (i.e. higher incomes) and also social (i.e. rural employment), cultural and environmental dimensions. Nevertheless, the role of LAS in development outcomes above all depends on the ability of local actors to cooperate and on their ability to define collective strategies of cheese differentiation.

This thesis aimed at deepening the knowledge of territory-based collective action in mountain cheese LAS. It intended to improve scientific knowledge, but also professional practices and public action in favor of the development of marginal rural areas. Future directions would consist in deepening and developing research. The first research avenue involves emphasizing the analysis of the complexity between territory and collective action, which includes the ideal (i.e. identity, representations) and political (i.e. hierarchy and conflicts) dimensions, as well as the link between collective action dynamics and territorial development outcomes. The second research avenue focuses on the implementation of participatory approaches to support the local actors in the design, implementation and evaluation of their projects.

Keywords: localized agrifood system; territory; mountain cheese; collective action; territorial quality differentiation; territorial development.

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Paper 2 Pachoud, C., 2020. The quality of territorial governance: an assessment of institutional arrangements. The case of the Serrano cheese production in the Campos de Cima da Serra, Southern Brazil. *Die Erde* 151 (1): 23-36. <https://doi.org/10.12854/erde-2020-424>

Paper 3 Pachoud, C., 2020. Collective action for cheese valorisation in the province of Trento/Italian Alps: an institutional approach. *Journal of Alpine research* (under review, second revision).

Paper 4 Pachoud, C., Labeyrie, V., Polge, E., 2019. Collective action in Localized Agrifood Systems: An analysis by the social networks and the proximities. Study of a Serrano cheese producers' association in the Campos de Cima da Serra/Brazil. *Journal of Rural Studies* 72: 58-74. <https://doi.org/10.1016/j.jrurstud.2019.10.003>

Paper 5 Pachoud, C., Delay, E., Da Re, R., Ramanzin, M., Sturaro, E., 2020. A Relational Approach to Studying Collective Action in Dairy Cooperatives Producing Mountain Cheeses in the Alps: The Case of the Primiero Cooperative in the Eastern Italian Alps. *Sustainability* 12(11): 4596. <https://doi.org/10.3390/su12114596>

Paper 6 Pachoud, C., 2019. Identity, feeling of belonging and collective action in localized agrifood systems. Example of the Serrano cheese in the Campos de Cima da Serra, Brazil. *Cahiers Agricultures* 28(28). <https://doi.org/10.1051/cagri/2019028>

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Abbreviations and acronyms

ABIQ	Associação Brasileira das Indústrias de Queijo (Brazilian Association of Cheese Industries)
AFN	Alternative Food Networks
AGEF	Arbeitsgruppe für Entwicklungsforschung (Working Group for Development Research)
APROCAN	Associação dos Produtores de Queijo Canastra (Canastra Cheese Producers' Association)
CAP	Common Agricultural Policy
CCS	Campos de Cima da Serra
CFPT	Federazione Trentina della cooperazione (Cooperation Federation of the Province of Trento)
CIRAD	Centre de coopération Internationale en Recherche Agronomique pour le Développement (International Center in Agronomic Research for Development)
CPRs	Common Pool Resources
CSA	Community Supported Agriculture
DAFNAE	Department of Agronomy, Food, Natural Resources, Animals and Environment
EAFRD	European Agricultural Fund for Rural Development
EMATER-RS	Empresa de Assistência Técnica e Extensão Rural do Rio Grande do Sul (Technical Assistance and Rural Extension Company of Rio Grande do Sul)
EMF	Fondazione Edmund Mach (Edmund Mach Foundation)
EPAGRI-SC	Empresa de Pesquisa Agropecuária e Extensão Rural de Santa Catarina (Agricultural Research and Rural Extension Company of Santa Catarina)
ERGM	Exponential Random Graph Model
EU	European Union
FAO	Food Agriculture Organization
FBPT	Federazione Provinciale Allevatori Trento (Federation of Breeders of the Province of Trento)
FCA	Factorial Correspondence Analysis
GAV	Gross Added Value
GDP	Gross Domestic Product
GMBA	Global Mountain Biodiversity Assessment
GREEN	Gestion des Ressources Renouvelables et Environnement (Management of renewable resources and environment)
HACCP	Hazard Analysis Critical Control Point
IBGE	Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics)
IMA	Instituto Mineiro de Agropecuária (Minas Gerais Institute of Agriculture)
INEA	Istituto nazionale di economia agraria (National Institute of Agrarian Economy)

INPI	Instituto Nacional da Propriedade Industrial (National Institute of Industrial Property)
INRAE	Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement (National Research Institute for Agriculture, Food and Environment)
ISTAT	Istituto nazionale di statistica (National Institute of Statistics)
LAGs	Local Action Groups
LAS	Localized Agrifood Systems
LEADER	Liaison entre actions de développement de l'économie rurale (Links between actions for the development of the rural economy)
LPS	Localized Production Systems
MAPA	Ministério da Agricultura, Pecuária e Abastecimento (Ministry of Agriculture, Livestock and Supply)
MDA	Ministério do Desenvolvimento Agrário (Ministry of Agrarian Development)
MEA	Millennium Ecosystem Assessment
MIPAAF	Ministero delle Politiche Agricole Alimentari e Forestali (Ministry of Agricultural, Food and Forestry)
PDO	Protected Designation of Origin
PGDR	Programa de Pós-Graduação em Desenvolvimento Rural (Graduate Program in Rural Development)
PGI	Protected Geographical Indication
PRONAF	Programa de Fortalecimento da Agricultura Familiar (National Program for the Strengthening of Family Agriculture)
RDP	Rural Development Program
RS	Rio Grande do Sul
SC	Santa Catarina
SEAPPA	Secretaria de Estado de Agricultura, Pecuária e Abastecimento (State Secretariat of Agriculture, Livestock and Supply)
SFSC	Short Food Supply Chain
SIM	Sistema de Inspeção Municipal (Municipal Inspection System)
TQR	Territorial Quality Rent
UAA	Utilized Agricultural Area
UN	United Nations
UNEP-WCMC	United Nations Environment Program–World Conservation Monitoring Center
UNESCO	United Nations Educational, Scientific and Cultural Organization
UFRGS	Universidade Federal do Rio Grande do Sul (Federal University of Rio Grande do Sul)
UNIPD	University of Padua
WB	World Bank
WB-ARD	World Bank – Agriculture and Rural Development Department
WTO	World Trade Organization

Introduction



Figure 1. A breeder and her herd in the Campos de Cima da Serra, Brazil (source: own photo, 2017).

The question of development in rural areas

A diagnosis

Rural areas and food production have undergone deep changes since the middle of the 20th century. First, production-oriented agriculture and global trade exchanges led to a standardization of production modes, food processing and distribution, which resulted in homogenized food products and eating habits (Ermann et al., 2017; Touzard and Fournier, 2014). At the same time, the development of global quality standards ensured a regular design of food products (Campagne and Pecqueur, 2014). This model has been developed to meet growing food needs and ensuring food safety while reducing food prices through economy of scale (Rastoin and Gherzi, 2010). However, standardization resulted in a great loss of diversity of traditional products, as well as practices and know-how related to their production (Delfosse, 2003).

The second important point is that most of the world agriculture, previously organized on local or national markets, has gradually become part of the global market. This led to the indexation of the product's prices to the global market (Ermann et al., 2017). In addition, globalization led to the spatial breakdown of food value chains, resulting in more complex global / local relations (Coe et al., 2008; Gereffi et al., 2005). Today, these global value chains are controlled by powerful multinational agribusiness companies which are most of the time located in the global North, downstream agricultural production (i.e. processing, agricultural supplies and distribution). The trend towards concentration is accelerating downstream while upstream production is still widely based on fragmented family farms. In addition, these companies often speculate on agricultural commodities to increase their profit, worsening price fluctuation (Rastoin, 2008).

The third point, that is a consequence of the first two, is the massive rural exodus that led to an increased urbanization rate and the emergence of megacities (Kraas and Mertins, 2016). Since 2007, the world's population has become predominantly urban. Nonetheless, despite the decrease of its share in global population, rural population is still growing in absolute terms (UN, 2019). Moreover, agriculture employs 40 % of the world population, making it the main economic sector in respect to employment (Campagne and Pecqueur, 2014). However, poverty is still a predominantly rural phenomenon, especially in the Global South where 85 % of the poor people are located in rural areas (Alkire et al., 2014).

Fourth, the agricultural model based on productivity and the use of fossil energy greatly contributes to the environmental crisis. Today, food production is responsible for one quarter of greenhouse gas emissions (Poore and Nemecek, 2018). In addition, agriculture contributes to the depletion of natural resources (e.g. water, soil or phosphorus) and is the largest contributor to biodiversity loss (Dudley and Alexander, 2017). Climate change is affecting food security and seriously threatening human well-being, especially in the global south. Indeed, changes in temperature and precipitation, which have led to a recurrence of droughts and floods, have negative impacts on agricultural production and often lead to conflicts and emigration (Burros and Kinney, 2016; Parry, 2019).

Limits of the traditional models of rural development

Until the end of 1970s, traditional models of rural development from regional sciences prevailed. One of these models is founded on the urban-rural relationships and the spread effects of cities (Stöhr, 1984). It is based on the idea that in order to develop, rural areas must be successful at taking advantage of the spread effects of cities, which concentrate resources (Torre and Vollet, 2016). However, this model of development has shown significant limits with regard to the increasing dependence of rural areas on urban areas. According to Galtung (1980), it is characterized by power domination of urban areas over rural areas and a marginalization of the latter. Ultimately, this model has led to an erosion of the development potential of the less developed areas (Stöhr, 1984).

A second model, called the export-base theory, promotes a sectorial approach, where agriculture is considered as a factor of growth for rural areas. It breaks down the economy in two sectors: a basic sector, intended for export, and a sector based on domestic production, intended for local consumption (Duesenberry, 1950). This model is based on the principle that basic activities provide the foundation of the enrichment of rural regions by selling the production on external markets, while the so-called domestic activities, which depend on local consumption, are induced by the basic activities. However, this model leads to a close link with global economic dynamics and therefore associates a higher level of concern in the event of a global crisis and price drop of agricultural products (Chilla et al., 2016). Progressively from the end of the 1970s, other economic activities in rural areas have emerged, especially in the Global North, first industrial and then tertiary through the increase of tourism and recreation. Consequently, there was a growing complexity and heterogeneity of rural actors, which was not limited to agricultural activities anymore (Torre and Vollet, 2016). These new activities

have been the source of diversification of the rural economic bases for certain rural regions. At the same time, these different uses brought a more complex definition of rurality and now call upon the multifunctionality of rural areas (Rieutort, 2012). According to Campagne and Pecqueur (2014), rural should not be characterized by the negative (i.e. what is not urban is rural), but rather rely on own criteria of definition, including population density, economic activity, relation to environment and social practices and representations.

Differentiation among rural areas

Globalization leads to inequalities of development between the so-called favorable and marginal rural areas not only between countries but also among regions of a same country (Leimgruber, 2004; Torre, 2015). On one hand, favorable rural areas associate their development process with their insertion in the global market. This model corresponds to a productivity model, designated also as dominant model, based on price competition to produce mass generic goods and services. Favorable rural areas enjoy most of the time advantageous natural conditions, proximity to markets as well as public investments and subsidies (Campagne and Pecqueur, 2014).

On the other hand, marginal rural areas can hardly compete with favorable rural areas, because they are less endowed with production factors (e.g. labor, capital, infrastructures) (Colletis and Pecqueur, 2004). These areas most often have unfavorable natural conditions for production-oriented agriculture (e.g. mountainous or dry conditions) and are located far from the markets (Leimgruber, 2004). A significant proportion of rural areas are considered as marginal. Within the European Union (EU), they represent for example 80 % of the agricultural area (Campagne, 2007). Moreover, these areas usually suffer from higher rates of poverty and exodus and many of them depend on remittances. Public authorities have often tried to mitigate these handicaps by correctors (e.g. investments in infrastructure), however this showed to be inefficient, as it does not change the mode of insertion of these areas in the market; they still have to face the competition law imposed by the world market (Campagne and Pecqueur, 2014).

Thus, the dominant model of food production, which is a reflection of contemporary capitalism, failed as evidenced by rising levels of poverty and environmental problems in rural areas. The failure is not to create enough wealth in total but rather in the inability to distribute it equitably among people and regions (Harvey, 2006; Piketty, 2013). More than wealth repartition, the dominant model of food production questions more fundamentally the

relationship between human and nature. However, this model has never emerged as a unique model of food production. In fact, there are many other models, as for example artisanal production, local agriculture, organic farming or agroecology (Bowen and Mutersbaugh, 2013; Ermann et al., 2017; Touzard and Fournier, 2014). It becomes therefore urgent to rethink and support alternative models for a sustainable development in rural areas.

Toward a new model of development for marginal rural areas

The dominance of the market as a regulatory tool condemns all development in marginal rural areas, given the impossibility for them to adopt the productivity model (Campagne and Pecqueur, 2014). Faced with the negative effects of the traditional models of rural development, some marginal rural areas demonstrate capacity to redefine their development paths through endogenous development.

Since the late 1970s, the concept of endogenous regional development, also called development from below, developed in German-speaking literature (Hahne, 1985; Stöhr, 1981; Stöhr and Taylor, 1981; Stöhr and Tödting, 1977). This vision is based on the idea that the dynamism of the local economy is linked to the local actors themselves and their organizational capacity to valorize the local resources (both natural and human) (Stöhr, 1984). Thus, endogenous regional development stands out clearly from top-down development models led by governments. In this vision, the competitiveness of the firms depends on their capacity to innovate and propose quality products through local cooperation and networks (Maier and Tödting, 2002). This development model brought a larger reflection on the development modalities and its measurement indicators, which does not only rely on the economic dimension but also aims at improving the quality of life of the local people.

From 1980s, the concept of territorial development, which is affiliated to the model of endogenous development, developed in French-speaking literature (Torre, 2015). However, this concept brings three key differences compared to the endogenous development model. First, it further deepens questions related to the cooperative dimension between the heterogeneous actors of the territories, including civil society. Second, it takes greater account of territorial innovations in a holistic way and not only the technical innovations (i.e. organizational, social, institutional) (Campagne and Pecqueur, 2014; Torre, 2015). Third, its greatest originality stems from the definition of territory, which has experienced a revival since the 1980s in French-speaking geography. Territory is defined as “a space that is simultaneously socially constructed, culturally marketed, and institutionally regulated” (Lopez and Muchnik,

1997, p. 23). It is no longer the administrative boundaries and its functionality that are at the center but rather the actors, their practices and their representations (Raffestin, 1982). The territory has therefore a dual nature, both material and ideal (i.e. symbolic) (Di Méo, 2016). In addition to these two dimensions, the territory is the crucible for collective action and has therefore a further organizational dimension (Di Méo, 2006). In fact, the actors within the territory coordinate themselves through a specific form of governance, called territorial governance (Moine, 2006).

Overall, the model of endogenous development and the related model of territorial development from the French-speaking geography, bring a paradigm shift compared to the traditional models of rural development. Nonetheless, the territorial development model places more emphasis on the symbolic and organizational dimension of rural development. The French literature will be therefore used in the thesis because it appears more suited to the research question, which concerns the study of collective action for territorial qualitative differentiation of mountain cheese in Localized Agrifood Systems (LAS). The following section provides further explanation on the concepts used in the thesis.

Presentation and justification of the theoretical bases of the research

Livestock grazing linked to cheese production is a common activity for most mountain communities. Indeed, this activity makes use of non-arable and marginal areas, while ensuring multiple economic, social and environmental functions. Cheese represents an essential source of food and income for various mountain populations. At the same time, the quality and distinctiveness of the cheese, most of the time made from raw milk, confer an added value upon milk and often becomes an identity and cultural object (Delfosse, 2006). In fact, mountain cheese is marked by a strong territorial anchorage. It conveys particular landscapes and forms of social organization marked by pastoralism (Barragán Lopez et al., 2010). In addition to its organoleptic distinction, mountain cheese has a strong cultural heritage based on know-how, history and culture of the local population (Delfosse, 2003).

The present research focuses on collective action for the territorial quality differentiation of mountain cheese in LAS. Due to the strong symbolic dimension of such agrifood systems, which are anchored in specific territories on one hand, and the central place of collective organization and the underlying governance structures on the other hand, the territorial approach as defined in French-speaking literature appears valuable for the present research. In addition, French-speaking literature is usually rarely translated and thus hardly

accessible. In this sense, the contribution from French-speaking geography will bring an original and additional benefit to this thesis.

The concept of LAS defines a type of organization of agrifood activities that are productive and also social and cultural (Cirad, 1996). It relies on the qualitative differentiation of food products linked to specific territories to highlight their typicality and singularity, as an alternative to standardized production. It puts the emphasis on collective action and shared forms of identity and knowledge (Bowen and Mutersbaugh, 2013). This approach is based on the relationship between humans, territory and products, through a multidimensional anchorage to the territory (e.g. physical, cognitive, historical, cultural and institutional). According to Moity-Maïzy (2010), "territorial anchorage is part of the creative reaction movement to the uncertainties and disparities produced by globalization". In this way, LAS correspond to a form of resistance to globalization, putting the territory at the center of the development dynamics (Di Méo, 2017; Muchnick and De Sainte Marie, 2010).

The process of territorial quality differentiation depends on the ability of the actors of the LAS to cooperate and act collectively (Muchnik, 2009). This process is based on the identification and valorization of the resources of the territory to offer specific products and services (Colletis and Pecqueur, 2004; Pecqueur, 2001). It mobilizes both material attributes related to intrinsic qualities of the product and intangible and symbolic attributes linked to its geographical origin (Canada and Muchnik, 2011; Fournier, 2008; Muchnik, 1996). Thus, particularities of the territory, specific know-how and also more complex characteristics relating to symbolic, identity and cultural contents are core attributes of differentiation (Janin et al., 2016; Muchnik et al., 2008). The construction of a reputation of the product related to a specific territory is the foundation of a territorial quality rent (TQR). The TQR corresponds to a higher price compared to a generic product, generated by the intrinsic and extrinsic quality of the product. This rent is therefore no longer based on the usual ratio of supply and demand but on a higher willingness to pay from consumers (Mollard, 2001; Pecqueur, 2001). This is based on a specific demand. In fact, besides the intrinsic attributes of the products, consumers also want to consume a territory that is the symbolic reflection of a culture, landscapes and identities (Canada and Muchnik, 2011). This requires interactions with the productive actors to share common values and representations (Peyrache-Gadeau et al., 2016). At the same time, growing attention toward products of specific quality, in developed as well as in emerging countries, facilitates the value sharing (Mollard and Pecqueur, 2007; Pecqueur, 2001), and the

growth of agritourism demonstrates the desire to rediscover traditional agriculture and typical products (Mollard et al., 2005).

In the specific context of LAS, the thesis seeks to increase understanding on collective action with a territorial approach. Three analytical frameworks, which are the Common Pool Resources (CPRs), territorial proximity and territoriality frameworks, will be crossed in order to embrace the complexity of the interactions between territory and collective action.

First, the CPRs framework was developed by Elinor Ostrom, who analyzed self-organization and self-governance in CPRs. She contributed to the recognition of the institutional diversity of collective action outside the state / market dualism. According to Ostrom (2007a), successful collective action is first based on the core relationship of trust, reputation and reciprocity, which positively reinforce each other. In addition to the core relationship, Ostrom (2010) defined many more variables that affect the likelihood of collective action, and in turn, affect levels of cooperation, as the size of the group or the face-to-face communication. Moreover, collective action needs institutional arrangements that frame and encourage cooperation and include rules, which provide monitoring and sanction mechanisms, and organizations (Ostrom, 1990, 2007a). In many cases, the success of collective action is highly dependent on the institutional arrangements constituted by participants in a self-governing process, rather than being imposed by external authorities (Ostrom, 1997). Nonetheless, governments are also important in potentially coping with problems of collective action, by offering legal frameworks that recognize the legitimacy of local groups to supply their own institutional arrangements (Ostrom, 2014). Consequently, I question the possibility of applying the CPR framework to LAS. However, in this specific case, common goods correspond to the production of the reputation of the product linked to a specific territory. The quality, which is at the foundation of the reputation, is related to intrinsic and extrinsic attributes (Barjolle et al., 1998). Reputation in LAS takes the form of a club good (Torre, 2002) and is characterized by the exclusion of benefits and by a partial non-rivalry (Buchanan, 1965). The maintenance and enhancement of the reputation therefore requires the implementation of institutional arrangements (i.e. rules and organizations).

Second, the territorial proximity, developed by the French School of the Proximity, carries potential in terms of collective action (Courlet, 2008; Pecqueur and Zimmermann, 2004; Torre and Beuret, 2012). In fact, territorial proximity is divided into two forms of proximities. On one hand, geographical proximity, which is a matter of distance, favors exchanges but is

not the only determining element. Cooperation is also fostered by organized proximity, which includes two different logics: first, the belonging logic which refers to networks of formal relations (i.e. collective organizations) and second, the similarity logic which gathers individuals who share common values (e.g. in terms of culture) (Torre and Beuret, 2012).

Third, territoriality is defined as “a system of relationships that a community, and hence an individual who belongs to it, maintains with externality and / or otherness thanks to the help of mediators” (Raffestin, 1982). Territoriality reveals the way in which everyone creates their relationship with the spaces they practice, represent and identify with (Di Méo, 2016). In other words, territoriality corresponds to the feeling of belonging (Brunet, 1990). Thus, territoriality expresses personal and collective identities produced by territorial representations and expressed through symbols spread over the territory (Brunet, 1990; Di Méo and Buléon, 2005).

In sum, the interest of these three approaches for the thesis can be emphasized. First, the CPRs framework aims at deepening the normative and institutional dimension of collective action. It aims more generally at understanding the modes of governance and the key actors, paying attention to the external context, in particular the role of governments in localized collective action. Then, the complementary approaches by the territorial proximity and territoriality allow to apprehend further territorial factors, that is to say the importance of the material (i.e. practices and infrastructures), ideal (i.e. culture, feeling of belonging and identity) and organizational (i.e. collective organizations) dimensions, in the emergence and development of collective action for the territorial quality differentiation of mountain cheese.

Research objectives and hypotheses

The general aim of this research is to **analyze how actors in mountain cheese LAS act collectively for the territorial quality differentiation of the cheese**. In return, it is to define how mountain cheese LAS can respond to the challenge of territorial development.

Research on LAS has gained a growing interest since 2000s and given rise to numerous empirical analyzes. This was the case for example of the territorial qualification of cheese in Southern America (Boucher, 2004; Boucher and Brun, 2010) or the geographical indications for coffee in Indonesia (Fournier, 2008), wine (Touzard et al. 2008) and cheese in France (Bérard et al. 2008). Other studies went deeper into collective action in LAS to analyze territorial development in Europe, Southern America and Africa (e.g. Barham and Sylvander, 2011; Bowen, 2010; Cerdan and Fournier, 2007; van de Kop et al., 2006). In addition, some scholars sought to deepen understanding on governance in LAS which was the case for

example of olive oil production in Spain (Sanz Cañada and Macias Vazquez, 2005), cheese production in France (Torre, 2006), cheese and rice production in Mexico (Tolentino Martínez and Del Valle Rivera, 2018; Torres-Sacido and Sanz-Canada, 2018), sheep and goat meat production in Italy (Perito et al., 2017), or cassava gari and palm oil transformation in Benin (Fournier, 2002). It is presumed that the present thesis will enrich the reflection on collective action in the context of mountain cheese in order to respond to the challenge of territorial development in mountain rural areas.

The research is divided into three specific objectives, and for each one, general and specific hypotheses are formulated to facilitate the conduction of the research. The three specific objectives with their relevant research questions, and general and specific hypotheses are presented in table 1, 2 and 3. To answer these objectives, the CPRs, territorial proximity and territoriality frameworks will be articulated and the data will be collected through both qualitative and quantitative methods.

The first specific objective is to **analyze the territorial governance structures and the collective strategies implemented to differentiate mountain cheese**. More particularly, the objective is to go deeper into institutional processes at the local scale and to improve knowledge on the role of higher institutional levels (table 1). To achieve this specific objective, semi-structured interviews with the key actors coupled with semi-structured historical interviews with producers, as well as legal texts, historical and scientific literature analysis were conducted to perform a historical analysis of the cheese production organization. Moreover, semi-structured interviews with key actors of the LAS were undertaken to analyze the actual institutional arrangements.

Table 1. Research questions and hypotheses related to the first specific objective.

Research questions	General hypotheses	Specific hypotheses
<p>What territorial governance structures allow achieving collective action for territorial quality differentiation of cheese? What is decisive in collective strategies for the protection of the cheese reputation?</p>	<p>H1. Coordination among local private and public actors and support from higher administrative levels are crucial to the success of collective action for cheese differentiation.</p>	<p>H1a. Collective action tends to be more efficient when there is a strong coordination between local private and public actors (mixed form of governance).</p> <p>H1b. Multilevel institutions and organizations increase coordination and cooperation among the actors of the LAS.</p> <p>H1c. Collective action tends to be more efficient with a unified administrative context over the territory.</p> <p>H1d. Collective action is a long-term process and is facilitated by the habit of working together.</p> <p>H1e. Agritourism is central for cheese differentiation and requires coordination between actors promoting tourism and those involved in the production.</p>
	<p>H2. Collective strategies for cheese differentiation require the design of local institutional arrangements.</p>	<p>H2a. The boundaries of the geographical area of production should match the original area of production related to a specific culture.</p> <p>H2b. The differentiation process requires the definition of exclusion mechanisms, through the design of exigent production rules and sanctions to protect and enhance the reputation of the cheese.</p> <p>H2c. The local institutional arrangements must be defined by the local actors themselves to be efficient in protecting and enhancing the cheese reputation.</p>

The second objective is to analyze relational processes within a collective organization to understand what is determinant in achieving collective action for cheese differentiation (table 2). To attain this objective, a social network analysis of advice relationship among the members of an organization (producers' association and dairy cooperative) and an assessment of trust and conflict, which include an analysis of geographical and organized proximity, were carried out.

Table 2. Research question and hypotheses related to the second specific objective.

Research question	General hypotheses	Specific hypotheses
What relation structures among producers of a collective organization allow successful collective action for cheese differentiation?	H3. Successful collective action among producers of a collective organization requires horizontal relationships and shared norms.	H3a. High level of organizational trust and reciprocity, reflected by dense networks, are instrumental to achieve collective action. H3b. A lack of hierarchy regarding the socioeconomic status of the producers is more likely to increase cooperation, and therefore collective action. H3c. Collective action achievement requires revealing and resolving the conflicts through rule design. H3d. The presence of leaders based on prestige tends to facilitate collective action.
	H4. Geographical and organized proximity allow for greater interactions, trust, and therefore collective action.	H4a. Producers living in villages are more likely to interact than isolated producers. H4b. Producers that are geographically isolated tend to participate less in collective action. H4c. The creation of temporary meeting areas through a belonging logic are crucial to increase face to face interactions. H4d. Participation in cultural events increases interactions.

The third specific objective is **to link producers' representations of identity and the feeling of belonging to territory to their degree of involvement in collective action** (table 3). To respond to this third objective, quantitative approach (word association method) and qualitative approaches (structured interviews) were combined to determine the content of the representation of the producers' identity and to assess their feeling of belonging. The results have been correlated to their degree of involvement in collective action.

Table 3. Research question and hypotheses related to the third specific objective.

Research question	General hypothesis	Specific hypothesis
Is there a relationship between the producers' representation of identity, the degree of feeling of belonging and collective action? If yes, what dimensions are instrumental?	H5. Producers' representations of identity and a strong feeling of belonging to the territory are linked to the degree of involvement in collective action.	H5a. Positive representations of identity allow greater involvement in collective action. H5b. A strong feeling of belonging to the territory allows greater involvement in collective action.

To achieve these objectives, I conducted the research in two different study areas, the Campos de Cima da Serra in Brazil and the province of Trento in Italy. The next section provides a brief description of both case studies.

Two case studies of cheese production in mountains

The research was carried out in two mountain areas. The first study area is located in the Campos de Cima da Serra in southern Brazil, where the Serrano cheese is produced. The region is located in two different states: Santa Catarina and Rio Grande do Sul. The Serrano cheese is a traditional raw milk cheese, produced as a by-product of beef cattle farming. More than 90 % of the farms belong to small-scale family units. It is estimated that more than two thousand families produce Serrano cheese. However, production is mainly informal. Indeed, the Brazilian legislation does not authorize marketing raw milk cheese with less than sixty days of maturation. Most of Serrano cheese producers do not respect this restriction because consumers prefer young cheese over mature. Moreover, the sanitary norms in Brazil for dairy products do not consider the specificities of artisanal production, subject to the same sanitary

standards and facilities as big dairy industries. Thus, it is impossible for small-scale producers to comply with current legal standards because of the high costs of adaptation to food safety rules. Moreover, the production is not well organized among the local actors. The first producers' associations emerged during the last decades in order to defend and valorize the Serrano cheese. In 2017, the Campos de Cima da Serra protected denomination of origin (PDO) has been requested to the authority in charge of the certification (Pachoud and Schermer, 2019; Pachoud, 2019, 2020).

The second study area is located in the province of Trento, in the Italian Alps. Dairy cattle breeding associated to cheese production have always been an important agricultural activity in the province. Most of the producers are grouped into cooperatives in order to organize the production. Today, around 750 producers confer the milk to seventeen dairy cooperatives spread over the province, which process milk into cheese. The cooperatives are associated with the Concast-Trentingrana, the Consortium of Dairy Cooperatives of the Province of Trento. The consortium offers technical assistance to dairies and carries out milk and cheese analyses to regulate the price according to the quality. It also undertakes the ripening and marketing of cheese that are not sold directly by the dairies, and produces butter and milk powder (Concast, 2019). Several types of cheese are produced in the province. First, the Trentingrana, which is PDO certified, is the most important in volume and is produced all over the province. Then, eight other traditional cheeses are produced in different valleys of the province, of which only two have PDO certification.

Dissertation organization

The present thesis is organized into five chapters and the results are presented in six articles in a cumulative dissertation. Each chapter is described as follow:

Chapter 1. Theoretical framework

This chapter provides in a first section the theoretical bases for the traditional models of rural development, as well as endogenous development, from the regional sciences. It focuses later on territorial development, LAS, territorial quality differentiation and territorial governance from the French-speaking geography. Then, in a second section, it presents different models of collective action, providing a large explanation of the Ostrom's framework. In a third section, it exposes the conceptual bases on mountains and mountain grazing systems.

Chapter 2. Research design

This chapter provides details on the research approaches, the theories and the methods of data collection and data analysis that are used in the thesis. It explains in a first part the research design, its conception and conduction. In a second part, it details the methods used for each specific objective.

Chapter 3. The case study areas

This chapter presents the two case study areas: the Campos de Cima da Serra in Brazil and the province of Trento in Italy. It describes first the agricultural context and rural development models in both countries. Then, it explores more precisely both study areas.

Chapter 4. Papers: abstracts

This chapter exposes the abstract of the six papers: four related to the case study in Brazil and two to the case study in Italy. These papers are spread into three sessions and each session is associated to a specific objective, presented in table 4. While the first session is related to the analysis of territorial governance and collective strategies (paper 1, 2 and 3), the second session is dedicated to the relational analysis within a collective organization (paper 4 and 5), and the third session is linked to the social representation of identity and feeling of belonging (paper 6).

Table 4. Repartition of the papers according to the specific objectives of the thesis.

Specific objective	Paper n°	Fieldwork	Reference
1	1	Brazil	Pachoud, C., Schermer, M., 2019. Reconciling Tradition and Innovation in Traditional Mountain Cheese Value Chains: The Role of Social Capital. The Case of the Artisanal Serrano Cheese Value Chain in Southern Brazil. In: E. Landsteiner and T. Soens (Eds.), <i>Farming the City. The Resilience and Decline of Urban Agriculture in European History</i> . Innsbruck/Wien/Bozen: Rural History Yearbook 16, pp. 189-217.
	2		Pachoud, C., 2020. The quality of territorial governance: an assessment of institutional arrangements. The case of the Serrano cheese production in the Campos de Cima da

			Serra, Southern Brazil. <i>Die Erde</i> 151 (1): 23-36. https://doi.org/10.12854/erde-2020-424
	3	Italy	Pachoud, C., 2020. Collective action for cheese valorisation in the province of Trento/Italian Alps: an institutional approach. <i>Journal of Alpine research</i> (under review, second revision).
2	4	Brazil	Pachoud, C., Labeyrie, V., Polge, E., 2019. Collective action in Localized Agrifood Systems: An analysis by the social networks and the proximities. Study of a Serrano cheese producers' association in the Campos de Cima da Serra/Brazil. <i>Journal of Rural Studies</i> 72: 58-74. https://doi.org/10.1016/j.jrurstud.2019.10.003
	5	Italy	Pachoud, C., Delay, E., Da Re, R., Ramanzin, M., Sturaro, E., 2020. A Relational Approach to Studying Collective Action in Dairy Cooperatives Producing Mountain Cheeses in the Alps: The Case of the Primiero Cooperative in the Eastern Italians Alps. <i>Sustainability</i> 12(11): 4596. https://doi.org/10.3390/su12114596
3	6	Brazil	Pachoud, C., 2019. Identity, feeling of belonging and collective action in localized agrifood systems. Example of the Serrano cheese in the Campos de Cima da Serra, Brazil. <i>Cahiers Agricultures</i> (28)28. https://doi.org/10.1051/cagri/2019028

Chapter 5. Discussion: a comparative approach

This chapter exposes and discusses the different results of the research and provides a comparative analysis of both case study areas. Moreover, it assesses territorial development for both case studies, through the use of indicators.

Conclusion and perspectives

This chapter presents the main findings and contributions of the research and brings perspectives for further research.

Appendices

This section provides the six articles.

Chapter 1. Theoretical framework



Figure 2. Dairy cattle grazing in Alpine pastures in the Dolomites, province of Trento, Italian Alps (source: own photo, 2019).

1.1. Toward a territorial development in Localized Agrifood Systems

Introduction

Most of the time favorable rural areas adopt the dominant model of food production and in terms in logic of price competition, they produce generic products and services intended for the global market. Marginal rural areas can hardly rely on this model as they are less endowed with production factors and are therefore not enough competitive. Nevertheless, some rural areas shift towards a specific market where consumers are looking for particular goods and services. In fact, globalization can offer new paths of development for these rural territories through the differentiation of their products based on specific quality attributes linked to the origin. For that, local actors need to act collectively to identify and valorize the so-called territorial resources in order to offer specific products and services. This first chapter investigates the theoretical aspects on rural development based on agrifood systems anchored in specific territories. First, after describing some main theories of rural development from the regional sciences, I put in perspective the German-speaking literature on endogenous regional development and the French-speaking literature on territorial development. Then, I describe the theoretical foundations of the concept of territory from the French-speaking geography, justifying the use of the French literature in my thesis. Second, I establish the bases of the model of Localized Agrifood Systems (LAS), outlining the two central dimensions of territorial anchorage and heritage. Third, I characterize the two pillars of territorial development in LAS. The first pillar corresponds to the process of territorial quality differentiation, which is divided into three steps: the identification of the territorial resources; the valorization of specific products resulting from the territorial resources; and the combination with other specific products and services. The second pillar is related to territorial governance, characterized by the coordination among the heterogeneous actors of the territory and founded on territorial proximity.

1.1.1. From the traditional models of rural development to territorial development: a renewed approach of resources

This section starts with describing the theoretical bases of the traditional models of rural development, provided by the regional sciences and then moves to developing the model of endogenous regional development from the German-speaking literature and territorial development with the related concept of territory from the French-speaking literature. This section justifies the selection of the territorial approach for the thesis.

1.1.1.1. The foundations of regional sciences

Regional sciences appeared in the mid-20th century, when governments of the global North became aware of regional disparities within their countries (Torre, 2015). The “growth poles theory” is one of the most significant works in regional sciences (Hirschman, 1958; Perroux, 1955). It corresponds to the idea that economic development spreads in particular from urban centers, where there is a spatial polarization of activities, exercising spillover effects on their spatial areas of influence. The main point of this theory is that the convergence of growth rates eliminates disparities among regions. The resources (i.e. input into the production process) are mainly located in the centers and are initially present (e.g. raw materials, labor and capital). Moreover, the polarization of activities gives the ability to the centers to gather and renew these resources, and therefore to maintain the hierarchy (Bathelt and Glücker, 2012; Brunotte et al., 2002; Kébir, 2016). The center-periphery model plays also a central role in regional sciences. It was developed in particular by Prebisch (1959), Friedmann (1966) and Galtung (1972) and stems from the dependency theory linked to developing countries. This model corresponds to a relationship of inequality and domination between two spaces, on any scale (i.e. between countries or regions or even within a region). This means that spaces are organized hierarchically according to a duality between a dominant center and dominated peripheries. The center is characterized by a concentration of population, production and service activities, cultural offer and places of power. By the asymmetry of exchanges, the periphery is dependent and subordinate to the center (Bathelt and Glücker, 2012).

The export-base theory has also a relevant place in regional sciences (Duesenberry, 1950; North, 1955) as it breaks down the regional economy into two major components: a basic sector, producing goods and services for export, and a sector of domestic production, intended for local consumption. The expansion of the basic sector is at the origin of development, causing multiplier effects on the entire regional economy by capturing external incomes and increasing local wages. This dynamic results in an increase in the level of consumption and growth of the domestic production sector. From this perspective, it is therefore an external demand that defines the level of growth and exchange that promotes regional development (Bathelt and Glücker, 2012; Chilla et al., 2016).

These theories consider that the regions have different resource endowments. They suggest therefore that spillover effects or exchange favor regional development. However,

these theories face limitations because of their failure to resolve actual development inequalities among regions (Harvey, 2006).

1.1.1.2. The endogenous regional development approach

Formulated in the late 1970s in the German-speaking literature, the endogenous regional development approach breaks with the logic of the previous models of regional development (Brugger, 1985; Friedman, 1982; Stöhr, 1984). Indeed, it is no longer a spillover effect from the centers or an external demand that defines growth, but the consideration of regional potentialities (Hahne, 1985). These potential factors can be economic, socio-cultural and / or ecological. In fact, there are no simple recipes for regional development, as it depends on the local peculiarities. This approach goes against the spatial planning policies decided by the state and characterized as "top-down". It arose above all from concerns about globalization, which was then seen as a threat for the development of rural areas (Chilla et al., 2016).

In such development logic, regional actors design their own development goals, taking into account the socio-economic, natural and cultural characteristics of the region. The aim of endogenous regional development is not only the economic growth but also to improve the quality of life of local people. Moreover, endogenous regional development seeks to meet the requirements of the three fundamental pillars of sustainability (i.e. ecology, economy and social). According to Maier and Tödting (2002), endogenous regional development must be cross-sectoral and be impulse by the concentration of small and medium-sized firms over the region. Innovation is often considered as the motor of development, which emerges through cooperation and networks in the region. The endogenous approach participates to the emergence of new concepts, such as industrial districts (Becattini, 1979), cluster (Porter, 1998), innovative milieus (Aydalot, 1986) and Localized Production Systems (LPS) (Courlet and Pecqueur, 1994).

From this new perspective, local resources are means of emancipation and development for rural areas. This approach is based on collective learning processes and innovation dynamics driven by local actors. Indeed, innovation allows rural areas to remain competitive by a valorization of local particularities to produce quality products and therefore to find a place in the globalized world (Maier and Tödting, 2002).

1.1.1.3. Focus on the current conception of territorial development in French literature

Research on territorial development appeared in the 1980s in French literature, to counter the administrative hierarchy which imposed a top down model of development (Campagne, 2016; Campagne and Pecqueur, 2014; Moine, 2006; Torre, 2015; 2018). The territorial development approach is affiliated with endogenous regional development. Similarly, territorial development emerges from local dynamics of creativity and innovation to valorize the resources of the territory to produce specific products and services (Campagne and Pecqueur, 2014; Glon and Pecqueur, 2016). In territorial development, local actors decide for themselves on the objectives to be achieved (Deffontaines et al., 2001). According to Angeon (2008, p. 239), territorial development is defined as the "propensity of the actors to agree and organize themselves to collectively engage actions responding to one or more objectives that they share in common". However, territorial development does not correspond to a self-sufficient vision of development but rather depends on exchange with the outside world. As for endogenous regional development, it does not aim necessary at increasing the economical wealth, but rather more generally at improving the well-being of the populations (Torre, 2015; Torre and Beuret, 2012). Nonetheless, to trigger a territorial development process, specific products should have a price level that allows improving income and the satisfaction of the needs of the local actors. The added value created should be distributed fairly among the actors, through more balanced power relations (Campagne and Pecqueur, 2014). At last, territorial development brings greater concern on environment and protection of natural resources (Glon and Pecqueur, 2006; Sabbado Flores and Viera Medeiros, 2018). The creation and renewal of the specific resources are therefore key factors to enable long-term territorial development (Campagne, 2016; Colletis and Pecqueur, 1993).

Nonetheless, the analysis in terms of territorial development brings some nuances compared to the previous approach of endogenous regional development. First, territorial development brings a deeper concern on coordination among heterogeneous actors of the territory, through territorial governance (Koop et al., 2010; Pecqueur, 2001; Torre, 2018). In fact, the development process does not only concern productive actors and institutions in charge of development policies but also involves all actors of the territory (i.e. private and public), including civil society (Campagne and Pecqueur, 2014; Torre, 2015). Moreover, the supply of organizations, rules and norms by the local actors themselves are central to stimulate their organizational capacity and collective action (Campagne and Pecqueur, 2014; Koop et al., 2010). Second, the territorial development approach is strongly linked to that of territorial

innovation (Torre, 2015). This form of innovation does not aim at increasing competitiveness on global market, but at initiating a process of quality differentiation linked to a specific territory. Indeed, innovation has been often reduced to the technological dimension, referring to the initial definition of Schumpeter (1911). Technological innovation limits the benefits to only a small number of territories that are linked to a high level of industrialization or technology. Nonetheless, some territories attest to a much wider capacity of creativity from the local actors. This marks a turning point in relation to the technological paradigm observed in some previous concepts, such as Industrial Districts, Clusters, innovative milieus and LPS. In fact, territorial innovation relies on the inventiveness and cooperation of the heterogeneous local actors. The scientific knowledge is no longer the only one mobilized (Dargan and Shucksmith, 2008). Territorial innovation can be technological, such as new production methods or new packaging, but also new organizational (e.g. cooperatives), as well as social (e.g. direct marketing) and institutional (e.g. geographical indications). Moreover, the symbolic and cultural dimensions of the territory play a crucial role in territorial innovation (Kébir, 2016). However, the greatest originality of the model of territorial development comes from the definition of territory, which is developed in the next section.

1.1.1.4. What is the meaning of territory in French geography?

In the German-speaking geography, the concept of region is mainly used to characterize local development. Braun and Schulz (2012, p. 83) defined region as a “section of the earth's surface that can be defined and delimited via certain common or connecting characteristics and properties”. However, region can be shaped on very different scales and with different delimitation criteria. Chilla et al. (2016) identified four different criteria, which are the homogeneity (similar characteristics); the functionality (interconnected elements); the administrative (organization of political or administrative responsibilities) and the discursive (public debates: medias, politics or everyday life).

In French-speaking geography, the concept of territory has been adopted since the 1980s, in order to exceed the constraints of the administrative boundaries. Nonetheless, the definition of territory evolved over time. It seems therefore important to expose the definition used in the thesis, because its multifaceted definition can lead to misunderstanding.

Territory has a dual etymological source that comes from the Latin *terra* (earth) and *terreo, territum, terrere* (scare, repel). In the classical definition given in the 19th century, territory corresponds to "the extent of a country that belongs to some authority or jurisdiction"

(Larousse, 1875). In this definition, territory has a strictly political vision of the division of geographical space and refers to the area of domination of a state.

In the recent notion of territorial development, the territory is rather defined as a social construct by actors, who are at the same time economic and social (Di Méo, 2016; Pecqueur, 2005). Lopez and Muchnick (1997, p. 23) defined territory as “a space that is socially constructed, culturally marketed, and institutionally regulated”. This conception, retained for this research, is in opposition to the "given" territory, resulting from administrative boundaries (Colletis and Pecqueur, 1993). According to Brunet et al. (1992), territory is a human appropriation of space. In fact, it "is created by the appropriation (e.g. economic, ideological, political and social) of a space by groups that give themselves a particular representation of themselves, their history and their singularity" (Di Méo, 1998, p. 107). Therefore, territory is produced “affectively, socially, culturally and symbolically" (Blanc-Pamard and Quinty-Bourgeois, 1999, p. 11). A territory is not confined within defined limits. However, the limits are blurred and can change according to the interactions of the actors, who group together denser networks (Torre and Beuret, 2012). The limits refer to the perception of a feeling of belonging, as well as to specific rules of organization and functioning (Caron, 2005).

In this recent conception, the territory has a triple dimension: material, ideal and organizational which are complementary (Amblard et al., 2018).

First, the territory has a material and ideal dimension. In fact, it is a living and lived space; it is the space of the everyday life. Territory refers to the material aspect of practices (e.g. routines, leisure) and to the ideal aspect of representations (e.g. symbols) which is built over time (Di Méo 2016; 2017). According to Di Méo (1998), the territory is more often ideal than visually spotted and delimited. The combination of the material and ideal dimensions of territory corresponds in fact to territoriality, defined as “a system of relationships that a community, and hence an individual who belongs to it, maintains with externality and / or otherness thanks to the help of mediators” (Raffestin, 1982). Territoriality reveals the way in which everyone creates their relationship to the space, through practices and representations (Di Méo, 2016). In a single territory, there are several systems of relationships to space according to the social belonging of the individuals (e.g. women, elderly, workers, etc.). Di Méo (2014) explains that territoriality includes power relationships between social groups. In fact, he considers the territoriality as a spatial dimension of *habitus*, produced by the conditions of existence. Moreover, the territory has a strong role of collective identity support for the individuals who practice it and represent it. Indeed, the territory gives to identity a material and

ideal support rich in symbols, embedded in landscapes or other objects (Di Méo, 1998; 2014). Collective identity is a dynamic social construction and results from interactions between individuals, society and space. In fact, collective identity offers similarities to territoriality. They both have a material and ideal dimension. However, territoriality constitutes an individual relationship to the territory, while identity is based on a collective relationship to the territory and is fed by each one's territorialities (Di Méo, 2002). Collective territorial identity represents a mean of legitimizing a group in a territory and in turn contributes to reinforce the feeling of belonging. However, territorial identity can lead to ideological and political manipulations, if instrumentalized by dominant groups (Banos, 2009; Di Méo, 2017). Today, identities are plural because of the great mobility of people (Di Méo and Buléon, 2005). However, at the same time, the territory is often perceived as a trademark in an increasing globalization (Jaillet, 2009).

Second, the territory has a strong organizational dimension. In fact, the territory is a relevant area for collective action (Raffestin, 1986), framed by particular governance structures (Glon and Pecqueur, 2016; Lardon et al., 2008). Collective action is an organized and constructed action which leads to a set of solutions according to the territorial context (Moine, 2006). According to Raffestin (1980) and Di Méo (2014), there is no territory without actors intentionally engaged in actions with territorial implications. Di Méo (2014) defined three types of actors, for whom the territorial context influences the practices and representations. These actors have diversified and sometimes contradictory functions on the territory. First, the endogenous actors live and act in the territory (e.g. residents, firms, associations, local authorities). Then, the exogenous actors are located outside and have influence on the territory (e.g. governments). Last, the transitional actors are intermediate: they are born in the territory and settled outside but keep relationships and strategic interests in the territory. They often bring support to local projects. Thus, in a multi-actor approach, the territory is considered as the place of articulation between public policies and local initiatives, making it an intermediate level, between the local and the global (Amblard et al., 2018). According to Gumuchian et al. (2003, p. 91), the territory stands out as “the place of coordination between multiple actors, atomized, in a situation of asymmetry, with divergent interests and the place of coherence of various objectives, expressed at enshrined levels of organization”.

However, the concept of territory is often confused with the concept *terroir* (Bérard, 2011). The term *terroir* is defined according to three components: agronomic (*terroir* as a soil and climate support), technical (*terroir* as a space of know-how and practices), and historical and cultural (*terroir* as a vector of traditions) (Barjolle et al., 1998). Thus, the concept of *terroir*

only focuses on know-how, culture, history and natural conditions. Unlike the concept of territory, it does not address the collective capacity of the actors and the relation to social representations, which are central in this thesis (Frayssignes, 2005; Prévost et al., 2014).

Thus, the territory makes it possible to reintroduce the actor, its practices and representation, as well as the question of governance and collective action, to the center of the development dynamics. In this sense, the territorial approach developed in the French-speaking literature is particularly interesting for the thesis. Indeed, the boundaries of cheese production in mountain areas rarely suit to administrative boundaries. They are rather based on a strong symbolic, identity and cultural dimension. In addition, the capacity of collective organization of the local actors is central to build joint projects for the differentiation of their product. The next section presents the concept of LAS, which describes local food systems that are anchored within particular territories.

1.1.2. Localized Agrifood Systems: an attempt to focus on the territorial dimension of agrifood systems

LAS correspond to agrifood activities that are productive and also social and cultural (Cirad, 1996). This concept relies on the qualitative differentiation of food products based on a specific territory. This section presents the definition of LAS, and then focuses on its anchorage and heritage dimensions.

1.1.2.1. Definition of Localized Agrifood Systems

The concept of LAS appeared in 1996, as a result of research conducted by the CIRAD on agriculture and agrifood chains in Latin America and West Africa. It was inspired by researches on sign of qualities and on LPS (Courlet, 2002; Muchnik et al., 2007). The research highlighted both the resistance of certain specific agrifood products and the multiplication of small and artisanal agrifood businesses as a mean of combating poverty and marginalization of family farming (Muchnik et al., 2007). Nowadays, the concept has spread to the international community. In particular, a European research group and a research and development network in Latin America working on LAS were created (Muchnik and Sainte Marie, 2010).

LAS was defined as “production and service organizations (agricultural and agrifood production units, marketing, services and gastronomic enterprises, etc.) linked by their characteristics and operational ways to a specific territory. The environment, products, people and their institutions, know-how, feeding behavior and relationship networks get together

within a territory to produce a type of agricultural and food organization in a given spatial scale” (Cirad, 1996, p. 5). LAS are therefore at the crossroads of *Filières* and territorial analyzes. According to Canada and Muchnik (2011), the specificities of LAS rely on:

- the construction, activation and valorization of the links between human identity, territory and products;
- the identification of specific resources, their valorization and combination with other specific resources;
- geographically and socially coordination dynamics, articulating individual and collective strategies;
- diverse organizational forms, ranging from organized collective entities to fragmented atomized systems.

The concept of LAS focuses on the relations between identities and productive techniques; between preservation and reproduction of territorial resources and qualification of food products; and between agriculture and other uses of rural territories (e.g. tourism). LAS emphasizes on territorial anchoring of the product specificity (Fournier and Muchnik, 2012; Requier-Desjardins, 2010). Indeed, qualification of agrifood products linked to their origin, particularly through the institutionalization of PDO and other geographical indications (e.g. protected geographical indication (PGI)), is usually employed to show a specific relationship to the territory. Moreover, geographical indications can be a tool for overthrowing power relationships (Moity-Maïzy, 2010). For example, it can be the chance for artisanal producers to impose themselves against industrial companies by implementing PDO specifications for raw milk cheese production.

In addition to the actors involved in the supply of the food products and related services, consumers have a central role in LAS. In fact, consumers are increasingly attentive to the composition, production methods, as well as the effects on health and environment of food products (Requier-Desjardins, 2010). According to Muchnik (2006, p. 27), "the strength of the mouth is such that it can even change markets or redraw landscapes". Indeed, food is the only goods that is incorporated to the body (i.e. introduced into the body). Moreover, at the local level, food contributes to the construction of collective identities and has therefore a role of linking people to a territory (Muchnik et al., 2007).

To situate the LAS studies into a broader context, it appears interesting to compare this approach with the Alternative Food Networks (AFN) approach developed since the mid-1990s

in the English-speaking literature (Goodman et al. 2012; Maye et al., 2007; Maye and Kirwan, 2010) and largely adopted by the German-speaking literature (e.g. Opitz et al., 2017; Schermer, 2015; Zoll et al., 2018). AFN is used as a broad embracing approach that covers more specific concepts, which includes for example short food supply chains (SFSC) (Bazzani et al., 2013; Marsden et al., 2000; Renting et al., 2003) and community supported agriculture (CSA) (Allen et al., 2003; Blättel-Mink et al., 2017; Opitz et al., 2019). Both perspectives of LAS and AFN share similarities, as they constitute alternative agrifood systems, in the sense that they seek to resist and oppose to the globalization and industrialization of the food system and its domination by transnational agrifood companies. Nonetheless, Bowen and Mutersbaugh (2013) showed that both approaches present three key differences. First, the definition of locality differs between both approaches. In AFN, local corresponds to the system of distribution and exchange through new emerging producer–consumer relations (e.g. direct marketing, farmers markets), whereas in LAS, local is defined as anchored in particular socially constructed territories. Second, LAS places a stronger emphasis on collectivity and governance in terms of formal organizational structures and on shared forms of knowledge and identity. Third, LAS relies more on geographical indications while AFN focus more on alternative distribution frameworks (e.g. organic farming, fair trade, direct marketing). These points can bring interesting debates and further perspectives for both approaches.

1.1.2.2. Territorial anchorage as a central element in LAS

The links between food products and territory are multidimensional (i.e. physical, cognitive, historical, social and institutional) and constitute the territorial anchorage (Zimmermann, 1998). The notion of anchorage developed from the concept of embeddedness elaborated by Polanyi (1944) and was reaffirmed by Granovetter (1985). The authors considered it as the degree to which the economic activity is constrained by social relations. Anchorage is an intentional process, engaged by the actors of the LAS (Frayssignes, 2005). It results in a loss of mobility of the agrifood activities to other territories (Zimmermann and Pecqueur, 2004). Territorial anchorage in the case of LAS can be apprehended by three main categories of links between food products and territory (Canada and Muchnick, 2011):

- biophysical attributes (e.g. climate, topography);
- cultural heritage (e.g. knowledge, identities);
- socio-economic networks that link producers through common practices, perceptions and norms in a territory (Goulet and Chiffolleau, 2006).

Collective learning, knowledge construction and know-how are at the heart of anchoring. On one hand, there is a strong cognitive dimension related to the know-how shared locally between the actors. Know-how is defined as "the set of skills acquired, incorporated, transmitted that are manifested in the technical act and that involve the mobilization of many knowledge and representations" (Chevallier, 1991, p. 7). Thus, know-how is collective knowledge and is tacitly transmitted from one generation to another (Bouche et al., 2010; Muchnik et al., 2007). On the other hand, there are the dynamics of territorial innovation that allow resilience by supporting changes (Fournier et al., 2018).

According to Moity-Maïzy (2010, p. 49), "territorial anchoring is part of the movement of creative reaction to the uncertainties and disparities produced by globalization". In fact, on one hand, local actors are committed to better value a product in a logic of insertion into the short-term markets. On the other hand, a long-term logic and intergenerational transmission are instrumental to maintain the activity and the know-how, and to defend a culture. This results in a continuous exchange between products and knowledge and therefore in a modification of the territorial anchoring of the products. In fact, know-how has also undergone processes of borrowing and transmission from other territories (e.g. the tomato comes from South America but is today part of the typical Mediterranean diet), as well as adaptation through innovations (e.g. previously, the Serrano cheese had a rounded shape easier to be transported on the back of the mule. Today, it has a rectangular shape because it is more adapted to the modern consumption in sandwiches) (Canada and Mucknick, 2011). According to Bowen and Mutersbaugh (2013), this point is instrumental to grasp the difference between localized food systems and local food systems. In fact, the term local refers to "an inherent quality at any given moment" (Muchnik, 2009, p. 9). While the term "localized" refers to "a process, a system that has been localized, which was not always in that place and with no guarantee that it will remain there forever" (ibid).

1.1.2.3. Heritage as a guarantor of sustainability in LAS

Territorial heritage corresponds to the recognition of local particularisms (Di Méo, 1994). It is an intergenerational heritage applied to common goods. There are tangible and intangible heritages that are visible symbols in the territory (e.g. monuments, landscapes). Heritage is based on a collective agreement through the recognition of shared values of a resource (Peyrache-Gadeau et al., 2016). The process of heritage designation corresponds therefore to a reflexive valorization of the values of resources (Debardieux, 2009). Heritage

actively participates in the cultural and identity building of the territory (Di Méo and Buléon, 2005). In fact, it feeds social representations and increases the feeling of belonging (Delfosse, 2009).

Heritage designation is a basis for the preservation and the renewal of territorial resources (Di Méo, 1994; Peyrache-Gadeau et al., 2016). First, heritage allows the preservation and renewal of natural resources, ecosystems, landscapes, which are necessary for the production process of the food products. Furthermore, LAS are supposed to allow the maintenance of biodiversity by the use of domestic species (e.g. rustic local breeds) and environmentally friendly techniques (e.g. sustainable pasture management), although some activities can also have damaging consequences. Moreover, production has often a seasonal and perishable character, adapted to natural cycles (Muchnik et al., 2007). Second, heritage introduces the cultural and identity dimensions as a potential added-value for the product. In this sense, it allows valorizing and perpetuating know-how and traditions. Maintaining these environmental and socio-cultural dimensions is instrumental for the preservation and renewal of the food products, which ensures in turn a long-term economic valorization (François, 2008). These are the three pillars of sustainable development.

However, heritage and related traditions can sometime be reduced to a simple territorial marketing argument (Di Méo, 2016). Moreover, Bowen and De Master (2011, 2014) pointed out that heritage may reduce the diversity of available products. In addition, it can create overly static notions of culture and can be an instrument of exclusion of dominated groups. Last, it can foster the commercialization on external markets, which at the end can reinforce neoliberal market relations.

1.1.3. The pillars of territorial development in LAS

Territorial development in LAS is founded on two complementary pillars, which are the process of quality differentiation of the products based on a specific origin, and territorial governance. This section provides a description of these two dimensions.

1.1.3.1. Process of territorial quality differentiation

The process of differentiation constitutes an alternative to the dominant model. Indeed, it represents a possible exit for marginal rural territories from traditional price competition on generic market (Campagne and Pecqueur, 2014). This process corresponds to the offer of specific products and services through the mobilization and combination of territorial resources

(Colletis and Pecqueur, 1993). These specific products and services should make it possible to improve the incomes and satisfy the needs of the local actors, thanks to a higher price and a fairer distribution of the profits. These are the conditions to enable the process of territorial development. It is even truer that LAS are most often characterized by family farming and local processing of products which allows greater capture of added value and maintenance of jobs in the territory (Campagne and Pecqueur, 2014). Any territory is diverse in its resources and in the modes of differentiation. This can lead to a variety of possible territorial development paths (Janin et al., 2016). Nonetheless, this process suggests the creativity of the local actors (Glon and Pecqueur, 2016). It offers a potential for self-organization as it depends on the ability of the actors to organize and to develop original modes of emergence and valorization of the specific resources (Colletis and Pecqueur, 2004).

In LAS, differentiation emphasizes the territorial quality (i.e. intrinsic and extrinsic) of food products (Peyrache-Gadeau et al., 2016). This is achieved through the establishment of a reputation either by implicit agreement or through an official geographical indication (Sylvander, 1997). This process is built over the long term and results in a dynamic of collective learning both in terms of know-how and innovation (Colletis et al., 1999; Pecqueur, 2001). This process is decomposable in three phases, which will be presented in the following parts:

- a) identification of the territorial resources;
- b) valorization of the food products emerging from territorial resources;
- c) articulation with other specific products and services.

a) Identification of the territorial resources

A territorial resource is defined as "a specific resource that can be revealed through an intentional process, engaging a collective dynamic of appropriation by the actors of the territory" (François et al., 2006). It is then intentionally transformed by the local actors to allow the production of specific goods and services. The specificity of a territorial resource is marked by the geographical context (Campagne and Pecqueur, 2014). In fact, a territorial resource is anchored in the territory, in the sense that its production outside the territory is impossible (Colletis and Pecqueur, 2004). According to Brunet et al. (1992), a resource is always relative. This means that an element becomes a resource only when humans recognize it as such and assign a value to it (Brunet et al., 1992; Raffestin 1980). In fact, a territorial resource has a usage value that depends on its socialization and its appropriation by the actors (Brunet et al.,

1992; Janin et al., 2016). A territorial resource does not pre-exist before the action of the actors (François et al, 2006); on the contrary, a generic resource (e.g. unskilled labor, capital, raw material, information) is given; in the sense that it is present before the actions of the actors. The generic resource has a value independent from its production process and is thus transferable from one place to another. Its price corresponds to the exchange value, which is determined quantitatively by supply and demand (Colletis and Pecqueur, 1993; 2004).

A territorial resource is a social concept that depends on the spatial and temporal context. For Lamara (2009, p. 13) “what is a resource at a given time and in a given territory, is not necessarily at another time and in other places”. It comes from an initiative of actors to transform specific resources into marketable products or services (Campagne and Pecqueur, 2014). The resource presents therefore two states from one end to the other of the transformation process: potential and activated. In fact, the territorial resource can be initially latent, but not recognized and mobilized by the actors. Thus, the territorial resource depends of the capacity of the local actors to perceive opportunities and constraints from the world around them in order to develop projects of territorial development (Kébir, 2006). In fact, for Gumuchian and Pecqueur (2007, p. 5) the territorial resource corresponds to "a constructed characteristic of a specific territory and this, in a development perspective". Thus, the identification phase is a central phase of the differentiation process, and it relies on the discussion and agreement between the local actors on the potentials to emerge from their territory.

A food product often results from a systemic complexity: it comes from a synergy of different territorial resources. For example, mountain cheese is created from many territorial resources (e.g. pasture, milk, cattle, know-how, landscapes, etc.) that confer to it a specific intrinsic and extrinsic quality (Janin et al., 2016).

b) Valorization of the food products emerging from territorial resources

According to Colletis and Pecqueur (1993), territorial resources can be transformed into specific product or service valued on the market, which therefore acquire an economic value. Although many territorial resources are intangible and non-marketable (e.g. landscape, history), they contribute to the market valorization of the specific product. The valorization of specific products requires the capacity of the local actors to master the commercialization conditions, that is to say the decision on the commercialization modes (e.g. geographical indication) and the commercialization organization (e.g. tourism, direct marketing). For that,

the actors create often organizations (e.g. cooperatives, associations) (François et al., 2013). The valorization by the local actors reveals a new mode of wealth generation, which is no longer based on productivity. It should allow a better satisfaction of the needs of the local population, through a fairer added value distribution. Since the price depends partly on the quantity of product offered, due to the market law, the local actors should control the amount of production. Indeed, the price directly affects the incomes and therefore the possibility to satisfy the needs of local populations (Campagne and Pecqueur, 2014).

The relativity of the territorial resource questions the relationship between the internal perception of the local actors and the perception of the outside world (Hirczak et al., 2007). Indeed, it is necessary to differentiate the identification of the territorial resources by the local actors from the fact that they are recognized as such by external actors. These dynamics can be accompanied by the development of recognized references by the outside world. For example, the PDO attests to the origin-linked quality of the products on external markets (François et al., 2013). Local fests contribute also to its recognition outside the territory (Di Méo and Buléon, 2005; Janin et al., 2016). Thus, the construction of a specific offer by local actors is not only the result of strategies and coordination between local actors or processes of innovation and learning, but also results from a specific demand for these products (Campagne and Pecqueur, 2014; Janin et al., 2016). In fact, the demand interacts with the supply thus resulting in a sharing and appropriation of the values of the territorial resources, conveyed through the product (e.g. know-how, landscapes) (Peyrache-Gadeau et al., 2016).

Mollard (2001) highlighted the existence of a so-called territorial quality rent (TQR), which combines the intrinsic quality of the product (i.e. intrinsic quality effect) and its anchoring in a territory with its history, culture, know-how and landscapes (i.e. territory effect) (figure 3). The higher willingness to pay of the consumer constitutes the TQR and is based on a particular sensitivity towards the territory. It consists of buying the reputation related to the quality image of the territory that the consumer visits and appreciates. In other terms, it is a combination of private and public goods that contribute to developing a positive image of the territory. This leads to the formation of a consumer surplus, which when the basic need is satisfied, incorporates a growing share of intangible or symbolic values (Hirczak et al., 2008).

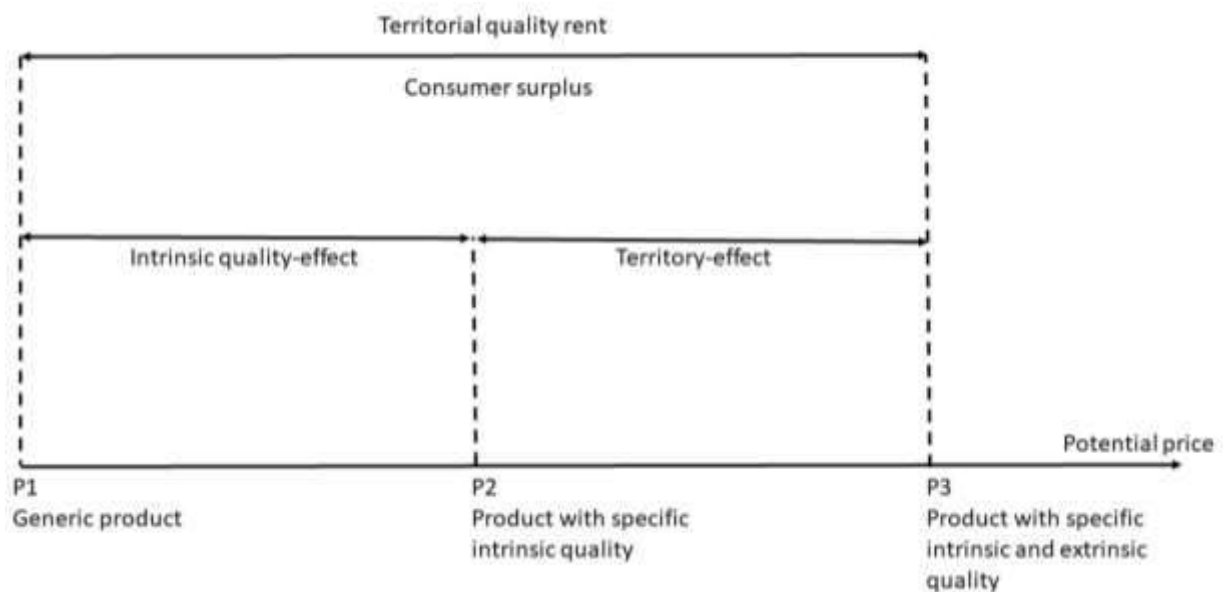


Figure 3. Constitution of the territorial quality rent (source: Campagne and Pecqueur, 2014, p. 166).

Even if a resource "is always a way to create wealth" (Brunet et al., 1992), a territorial resource carries other ethical, social and aesthetic values. However, market valorization can sometimes lead to problems. There is a risk of trivialization and thus devaluation of the resource (François et al, 2006). In addition, the systematic search for valorization can lead to conflicts or discrepancies between local actors and consumers, in the way it is staged on the market and the resulting folklorization. According to François (2008), valorization must lead to positive market recognition, from all the actors, that ensures the sustainability of specific resources and territorial dynamics. However, resulting higher prices of origin-related products appear to be a privilege of the better-earning and higher-educated classes, most often located in the global North (Ermann et al., 2017).

To situate the concept of TQR into the international literature, it might be related to a certain extent to the concept of monopoly rent, developed by Harvey (2001). The monopoly rent corresponds to the ability of social actors to increase their income because they have exclusive control over a product considered to be unique and non-reproducible. The unique nature of the product forms the basis of the monopoly price that creates the rent. It is linked to the local dimension and therefore to a specific culture. However, according to Harvey, the monopoly rent is part of the logic of capital accumulation that must support a form of differentiation to avoid standardization. At the same time, the desire for profit on values of culture and

authenticity can open spaces for alternatives in “which progressive forces of culture appropriate those of capital rather than the other way round” (Harvey, 2001, p. 411).

c) Articulation with other specific products and services

The basket of goods and services corresponds to an offer of related and non-substitutable products and services in a territory (Pecqueur, 2001). Consumers demonstrate a higher willingness to pay for acquiring the basket, constituting a TQR for the set of goods and services composing the basket. At the same time, the basket generates to the consumer a surplus higher than the sum of the surpluses of each product and service (Campagne and Pecqueur, 2014). It is often by the acquisition of a product leader that the consumer discovers other specific products and services. The basket therefore consists of products and services from different producers within the same territory. Their consumption is not necessarily simultaneous (Pecqueur, 2001). The creation of baskets increases the complexity of the actors present within LAS (Muchnik et al., 2007). Baskets are the result of a long-term territorial strategy involving coordination between the different actors, including the consumers (Pecqueur, 2001).

Pecqueur and Mollard (2001) consider that a basket of goods and services needs to meet these three assumptions:

- a set of complementary goods and services that reinforce themselves on the market;
- a combination of private and public goods that contribute to develop the reputation of the territory;
- interactive coordination between the involved actors (private and public) who share the TQR.

The basket combines a set of intrinsic attributes as well as symbolic and cultural ones. It relies also on local public goods that are only accessible in a given territory and for which the use implies to dive in this territory (e.g. landscapes, biodiversity, culture, traditions). These public goods influence the sustainability of the basket and territorial dynamics. The consumers often privilege a link of proximity and trust with the actors of the territory. The preference for local products or services results in an indirect preference for the territory itself. This explains why demand is not elastic in relation to prices (Hirczak et al., 2008). Tourism often plays a role of integrator of the resources of the basket, since it participates in the identification of the different products and services from an external view and leads to their direct valorization (François, 2008).

1.1.3.2. Territorial governance for the differentiation of specific food products

Territorial governance ensures the differentiation process, in which the territory becomes the place for coordination among the heterogeneous actors of the LAS (Goussios and Anthopoulou, 2016). In this section, after briefly reviewing the history of the concept of governance, I outline the definition of territorial governance developed in French-speaking geography (a). Then, I expose the concept of territorial proximity (b) and the notion of participation (c), which are central dimensions in territorial governance.

a) From governance to territorial governance

Broadly defined as “ways of governing” (Rhodes, 1996), governance includes ways of taking and implementing decisions. This concept, despite its growing use in several fields since the 1930s, remains ambiguous, with various interpretations (Boivin, 2008). This concept was first used to improve coordination within firms to increase their effectiveness. Secondly, this concept was used by the World Bank (WB) for developing countries in the context of structural adjustment policies (WB-ARD, 2009). Since the 1990s, this concept has been used at the global or supranational level under the term of good governance, as for example in the European case. Even if the different interpretations all agree that governance includes consensus-oriented and multi-level decision-making processes as well as dynamic interactions among a plurality of actors and sectors, this notion tends to have a neoliberal view in order to discredit the role of the state and give more power to private companies (Boivin, 2008).

Since the 1980s, we observed a growing interest for territorial governance, especially in French-speaking geography, related to the concept of territorial development (Pasquier et al., 2007; Torre and Beuret, 2012). This concept supports a shift from state government to the inclusion of diverse actors in decision-making processes. It corresponds to all the processes and arrangements by which actors of different natures (i.e. private or public) contribute to the development, sometimes concerted sometimes conflictual, of common projects for the development of territories (Leroux, 2006; Torre and Traversac, 2011). The principle of territorial governance refers to the idea that top-down public policies do not take into account the particularities of the local. The territory becomes therefore a relevant area of regulation of local relations as well as articulation with global relations (Simard and Chiasson, 2008). In fact, the territory promotes initiatives and the mobilization of local actors, encourages cooperation around common projects and best articulates public action with local characteristics (Pasquier et al., 2007). In this research, we will retain the definition given by Rey-Valette et al. (2010, p.

4), who characterize territorial governance as “a dynamic process of coordination between actors that are geographically close but with multiple identities (public and private) and asymmetrical resources (e.g. powers, knowledge, status) around territorialized issues. Territorial governance aims at the collective construction of objectives and actions by implementing multiple arrangements that are based on collective learning and participate in institutional and organizational reconfigurations / innovations within the territories”.

The process of differentiation is based on territorial governance (Pecqueur, 2001). It is a process of coordination among local actors for the organization of economic activity; it means to detect and valorize specific resources of the territory to propose specific products and services. This supposes a particular organization so that valorization benefits all the concerned actors. Gilly and Perrat (2003), and then Leloup et al. (2005) identified three modes of governance according to the private and / or public nature of the leading actors in territorial governance:

- Private governance corresponds to the case where a private organization is the key actor in the process of coordinating the actors;
- Public governance is a form of governance when one or more public actors play the central coordination role;
- Mixed governance is characterized by a variable density of interactions between the different categories of actors.

Territorial governance offers a new perspective of analysis compared to the more classical approach of value chain governance (Pachoud, 2020). In fact, the value chain approach is mainly sectorial and focuses on the sequence of complementary activities involved in the design, production and marketing of a product (Gereffi et al., 2005). This form of sectoral governance is often outside of spatial determinations. While the value chain governance involves the control of the production process and to the capacity for appropriation of the value created along the chain through vertical integration (Henderson et al. 2002; Janneaux, 2018), the territorial governance gives a relevant reading to the role of local synergies among heterogeneous actors, from different sectors. The spatial dimension has a central role since territorial governance is based on geographical and organized proximities (Torre and Rallet, 2005).

b) Territorial proximity

The notion of proximity has become a research path since the 1990s and has gained prominence, especially in the French literature (Filippi et al., 2018; Pecqueur and Zimmermann, 2004; Torre and Beuret, 2012). Since the 1990s, the French School of the Proximity, composed mainly of regional economists, plays a pioneering role in this area. The main objective of this research group is to determine the nature of the effects of proximity and to establish the endogenous role of space in economic theory (Gilly and Torre, 2000). In this study, we will decline two forms of territorial proximity: geographical and organized proximity (Pachoud et al., 2019; Torre and Rallet, 2005).

First, geographical proximity is a matter of distance. It corresponds to the number of kilometers separating two entities. It is relative to the morphological features of space, where topography plays an important role. This proximity can be related to the presence of transport infrastructures that allow mobility and information and communication technologies that allow ubiquity. This is called the functional distance (Bouba-Olga and Grossetti, 2008). The potential of interaction offered by geographical proximity depends on whether it leads to conflicts or brings benefits. The geographical proximity can be desired between actors (permanent or temporary) or unwanted (neighborhood, etc.) (Pachoud et al., 2019; Torre, 2010; Torre and Beuret, 2012).

Second, organized proximity relates to the different ways for actors to be close, outside the geographical relationship. The term “organized” refers to any structured set of relationships without prejudging the form of the structure (e.g. firms, community) (Bouba-Olga and Grossetti, 2008). The organized proximity is based on two essential but not incompatible logics: the belonging and similarity logics (Pachoud et al., 2019; Torre, 2010).

The belonging logic corresponds to actors of the same organization or the same network between which interactions are formed, such as exchanges of information or knowledge. Their relationship can be direct or intermediated, and also unequal in power and in access to resources. It is under constant construction, by adding or removing new connections in human relations.

The similarity logic corresponds to mental adherence to common categories; it results in individuals being at low cognitive distances from each other. This logic refers to the existence of norms which model the thoughts and the actions of the individuals. The individuals share common language or common values in terms of culture and religion. Thus, they are better

able to collaborate as they adhere to similar reference. The similarity logic is based on logic of tacit and facilitates interactions between people who did not know each other before. People linked by the similarity logic have in common a certain number of resources, material (e.g. diplomas) or cognitive and normative values (e.g. routines, values) (Bouba-Olga and Grossetti, 2008).

In sum, the proximities constitute the basis of territorial governance. They allow to shed light on governance mechanisms and to develop intervention instruments for governance dynamics (Torre and Beuret, 2012). In addition, they contribute to the creation of territories, by building limits of inclusion and exclusion (inside / outside). Moreover, they allow building new networks to implement common projects and to promote emergence of common visions, shared cultures and representations. Both proximities are neutral in their essence, they carry potential in terms of interaction and organization but can remain unexploited if they are not activated (Pachoud et al., 2019; Pecqueur and Zimmermann, 2004; Torre and Beuret, 2012).

c) The participatory dimension of territorial governance

Territorial governance refers to processes of formal and informal modes of interactions and power relations among local actors (i.e. horizontal relationships), as well as interactions between different levels of administration (i.e. vertical relationships) (Pisani, 2017). The horizontal relationships are weakly institutionalized. Trust is a key-element for cooperation (Boivin, 2008; Pasquier et al., 2007), however, governance remains fundamentally linked to higher administrative and decision-making levels (Pachoud, 2020). The increasing responsibility of the local level in decision making needs a vertical coordination linked to the principle of subsidiarity. This involves empowering local actors by giving them skills to take decisions at their own scales (Campagne and Pecqueur, 2014; Davoudi et al., 2008). One of the main challenges of territorial governance is therefore to manage equilibrium between horizontal and vertical relationships. Indeed, higher levels can support a part of the territorial development dynamic, but they can also lead to destabilizing or jeopardizing processes set up by local actors (Albaladejo and Bustos Cara, 2010; Torre and Vollet, 2016). It is therefore a question of strengthening local organizations through institutional support and the development of complementarities and synergies between the different levels (Cerdan et al., 2010a).

Territorial governance is fundamentally based on the participation of the various actors involved in the LAS (Chia et al., 2008). Participation is however controversial. On one hand, participation can stimulate the involved actors' interest and on the other hand, it may slow

down the achievement of objectives (Cooke and Khotari, 2001). According to Leloup et al. (2005), participation is not only a matter of asking local actors for their opinion but also of encouraging their membership and their involvement. Thus, participation is complex and is based on different indicators. First, the quality of participation depends on which actors participate (i.e. only few actors or every group of actors?). Then, it depends on the level of involvement (i.e. is there a simple attendance of the actors; are there few actors expressing their opinion or the majority is engaged in the discussion?). Furthermore, it sees if participation influences outcomes of decision-making. At last, participation can have different forms: political, social or civic, as well as formal or informal (Pisani, 2017). Participation relies on many sub-dimensions. First, the representativeness analyzes if the individuals' interests are well represented by participating actors. Then, empowerment gives the opportunity for actors to voice and express their opinion. Equity and solidarity are central in order to allow the dominated actors to take part in the process. After that, conflict management avoids divergences in the decision-making process (Boivin 2008; Da Re, 2014; Davoudi et al. 2008). Moreover, leaders based on prestige are central actors in territorial governance. They are individuals with authority, recognized as such by the major part of the actors. Leaders are dynamic actors who can serve as models. Indeed, they have a significant role in guiding the actions to be undertaken. They should promote group cohesion and equity as well as resolve conflicts (Boivin, 2008).

Governance can determine positive effects on territorial development by supporting more democratic forms of participation, access to decision-making to dominated groups and more generally, improvement in well-being (Secco and Burlando, 2017). However, these participatory processes can present significant limitations. Barbier and Larrue (2011) evoke the existence of situations of lassitude or disenchantment of actors for participatory approaches. For their part, Blondiaux and Fourniau (2011) tend to show a weak effectiveness of participative procedures. Moreover, participation processes can lead to reinforcing the dominant actors (Boivin, 2008). Indeed, territorial governance has to consider power relations and divergent interests, which can lead to conflicts. According to Boivin (2008, p. 135), territorial governance corresponds to “the management of the power relations of a localized society”. It is based on a balance between moments of conflict and phases of consultation (Torre, 2015). During the consultation phases, arrangements and agreements are established to define common objectives and projects. During the phases of conflict, opinions are confronted, which can reconfigure the power relations between actors. Conflicts can allow the integration

of actors who were excluded before (Torre and Beuret, 2012). Conflicts can be positive in collective dynamics when they lead to discussion and debate among actors having divergent interests or differing opinions (Torre, 2015), whereas a society without discussion is threatened and can lead to two tendencies: the extinction of oppositions when some groups do not manage to voice their aspirations and claims (e.g. resignation and discouragement) and the departure of a part of the population. Concurrently, Torre and Beuret (2012) identified three kinds of position toward conflicts: loyalty which consists of accepting the decision taken; exit which involves the abandon of collective action; and last the voice, which consists of opposing to the taken decision (Torre and Beuret, 2012).

Conclusion

This thesis aims at understanding collective action for territorial quality differentiation of mountain cheese in LAS. The territorial approach confers a strong symbolic and organizational dimension to local development dynamics, compared to the approach of endogenous regional development. In this sense, the territorial approach, developed in the French-speaking literature, appears valuable for the research. Indeed, LAS corresponds to agrifood systems anchored in specific territory, defined as a socially constructed, culturally marketed, and institutionally regulated space. The creativity of local actors is at the center of the territorial quality differentiation process to propose products that have specific intrinsic and extrinsic quality attributes. Territorial governance involves coordination among the heterogeneous actors, and ensures the process of differentiation. Simultaneously, this process requires a specific demand for these specific products. This allows the emergence of a TQR, which should result in higher incomes, distributed among the different actors involved and consequently in a better satisfaction of their needs. These are the foundations of territorial development in LAS (figure 4). The multiplicity of factors (i.e. territorial and contextual) involved in the processes of collective actions in LAS, highlights the importance of mobilizing different frameworks to understand the role played by these factors. Thus, the CPRs, territorial proximity and territoriality frameworks were chosen for the analysis. While the territorial proximity and territoriality frameworks were already exposed in this chapter, the next chapter provides a broader explanation of the CPRs framework developed by Elinor Ostrom.

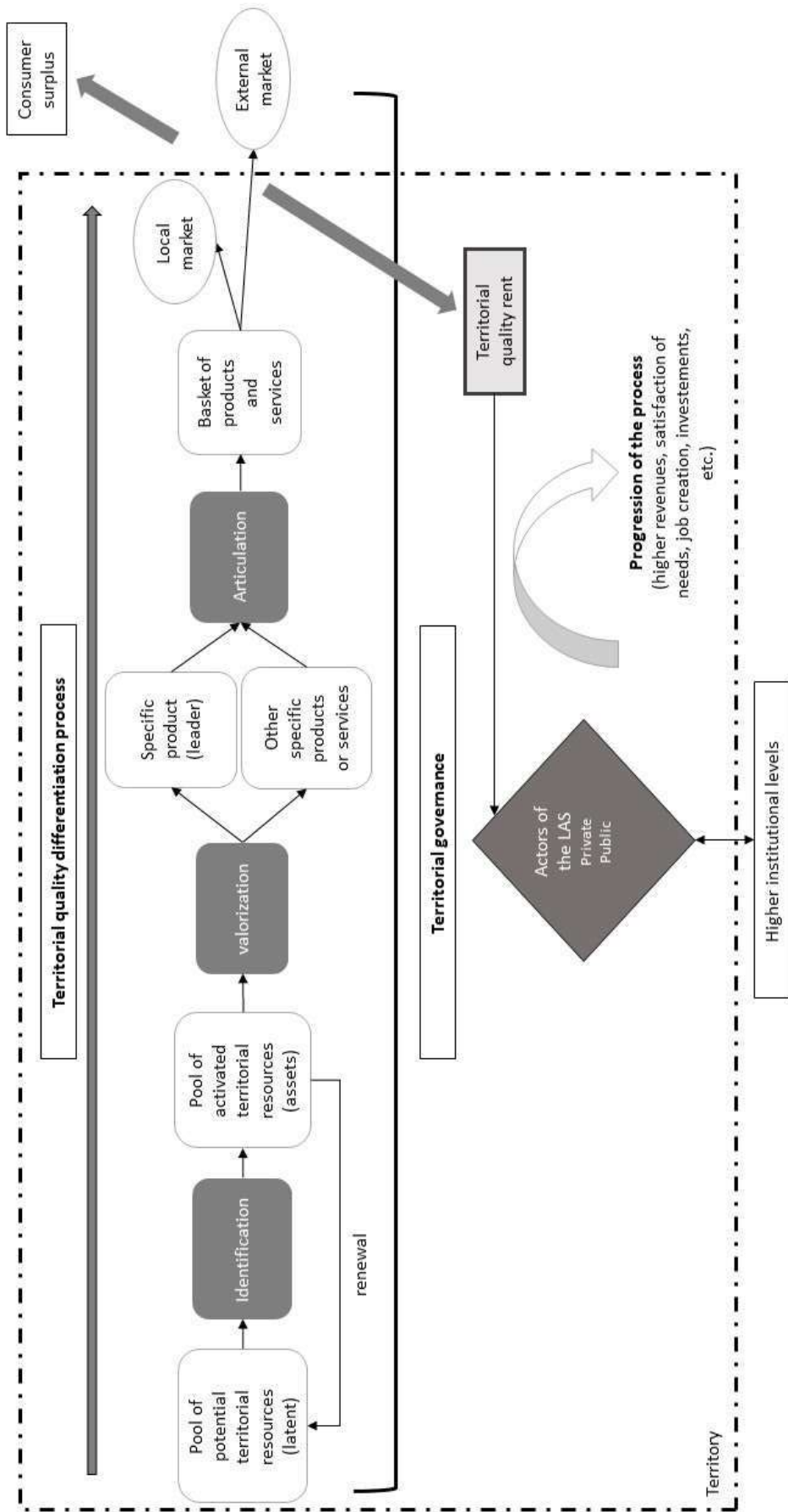


Figure 4. Territorial development dynamics in L/AS (source: own elaboration).

1.2. Applying the collective action framework of Elinor Ostrom to the analysis of collective action in LAS

Introduction

Territorial development can appear as a solution to the dominant model of food production and its effects of unequal development. This form of development is based on one hand on the establishment of a territorial governance and on the other hand on the differentiation process (Campagne and Pecqueur, 2014; Pecqueur, 2007), therefore territorial development depends on the capacity of the local actors to act collectively. In this section, we will present the conceptual foundations of collective action. The first part displays the conventional models of collective action. These models explain that in a dilemmic situation, individuals, guided by their own interests, will not cooperate to achieve collective benefits unless external incentives are given by state or market. The second part presents a less pessimistic framework. It corresponds to the one developed by Elinor Ostrom ("Nobel Prize" of economy in 2009) and her colleagues from the Bloomington School. This framework is part of the new institutional economy (see Coase, North, Williamson). It shows that in the face of coordination problems, allowing the actors to devise by themselves institutional arrangements can lead to better results than relying on public intervention or privatization. Ostrom has conducted numerous studies on self-organized communities managing CPRs to identify the conditions that allow a sustainable management. She worked mainly on groundwater, irrigation systems, fisheries, pastures and forests. She proposed a theory of collective action that contributes to the recognition of the institutional diversity of collective action outside the state / market dualism. Based on this, I will explain in a third part on how the framework developed by Ostrom can be applied to LAS to study collective action for the differentiation of origin-linked products, the mountain cheese in my case, along with the territorial proximity and the territoriality approaches.

1.2.1. Conventional models of collective action

This section provides three conventional models of collective action, based on the free-rider problem, which are the tragedy of the commons, the prisoner's dilemma game and the logic of collective action.

1.2.1.1. The free ride problem

Collective action is defined as an “action taken by a group (either directly or on its behalf through an organization) in pursuit of members’ perceived shared interests” (Marshall, 1998). It is expected that people who have common interest will act on it. However, experience shows that this is not always the case and that they often fail to cooperate to reach common objectives. Collective-action problems occur when individuals choose strategies based on a calculation that maximizes short-term benefits to one self and generate lower joint outcomes than it could have been achieved collectively (Ostrom, 1998). These individuals, called free riders, enjoy the collective goods without investing to produce it. Social dilemmas thus involve a conflict between individual rationality and optimal outcomes for the group (Poteete et al., 2010). The problem of free ride is a collective action problem and is particularly challenging, as it has the potential to undermine collective action.

1.2.1.2. Three foundations of a conventional theory of collective action

Classical models of collective action, including the tragedy of the commons, the prisoner’s dilemma and the logic of collective action, lead to the prediction that those using resources will not cooperate to achieve collective benefits. The free-riding problem is at the heart of these models. Whenever an individual cannot be excluded from the benefits that others provide, each individual is motivated to not contribute to the joint effort, but to free ride on the effort of others. Such situations are dilemmas because cooperation can generate higher benefits for all participants, but rational participants making independent choices will not achieve this result (Poteete et al., 2010). In these models, individuals are trapped in a situation, unable to change the rules (Ostrom, 1990).

First, Hardin (1968) developed the concept of the “tragedy of the commons”. He explained that a resource that is not appropriate is condemned to be overexploited. Each user has an interest in exploiting this resource as quickly as possible before the others do it. This is a dilemma because if everyone reasons individually, it is rational to exploit the resource as quickly as possible. Whereas collectively it would be more rational to define a total harvesting that allows the resource to survive. For Hardin, the common resources are condemned to overexploitation unless the resource is privatized, so that each one takes care of his share, or that the State regulates the harvesting. To illustrate his model, Hardin used the example of a pasture open to all. From the perspective of a rational herder, each herder is motivated to add

more and more animals because he / she receives the direct benefit. He concludes that “each man is locked into a system that compels him to increase his herd without limit – in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons” (Hardin, 1968, p. 1244).

The tragedy of the commons is often modeled by the prisoner’s dilemma game (Dawes, 1973). In game theory, social dilemmas are characterized by a situation where an individual has an interest in cooperating only if the other participants cooperate equally. However, in the absence of communication between the two players, everyone will choose to betray the other if the game is played once. If two players trust each other and cooperate, they can both receive a moderately high payoff. However, if one player cooperates and the other does not, then the one who did not cooperate receives an even higher benefit, while the other receives nothing (Ostrom, 2000).

In addition, Poteete et al. (2010, p. 44-45) made further assumptions, which include:

- “1. Decisions about strategies are made independently and simultaneously.
2. Participants cannot communicate with one another in any way.
3. All participants have complete and common knowledge of the exogenously fixed structure of the situation and of the payoffs to be received by all individuals under all combinations of strategies.
4. No external actor (or central authority) is present to enforce agreements among participants about their choices.”

Following these assumptions, the theoretical prediction is no cooperation when the game is repeated only once. However, in repeated games, players may engage in reciprocal cooperation to gain higher collective benefits (Ostrom, 2000).

In 1965, Olson offered an explanation of social dilemma in *The Logic of Collective Action*. According to him “unless the number of individuals is quite small, or unless there is coercion or some or other special device to make individuals act in their common interest, rational self-interested individuals will not act to achieve their common or group interest” (Olson, 1965, p. 2). Indeed, Olson argued that rational individuals guided by their own interests will not act collectively to defend the interests shared by the members of the group to which they belong, unless specific incentives encourage them to do so. The heart of his argument is that groups (predominantly economic organizations) produce common goods that can be consumed by each of the members of the group, even by the free riders who do not contribute to their production. The only answer to the free-rider problem is to offer extra incentives to

participate, beyond the goals themselves. These incentives may be economic incentive or coercion, as well as recognition, prestige or psychological rewards of participation. Nevertheless, according to Olson, the principles of collective action vary according to the size of the groups. He postulated that when the size of the group increases, the importance of the contribution of each member to collective action decreases, like the fraction of the collective goods that each member can benefit from.

These models may allow achieving close-to-optimal outcomes in competitive market situations. However, according to Ostrom (2007a), they do not explain individual behavior in cases of social dilemmas. Collective action requires explanations of a more complex type. To deal with this, Elinor Ostrom developed a norm-based model.

1.2.2. A behavioral theory of collective action: the contributions of Elinor Ostrom

This section provides the theoretical basis of the framework of collective action developed by Elinor Ostrom. According to her, the success of collective action for the management of CPRs relies on norms (i.e. trust, reciprocity and reputation), local and external variables and the design of institutional arrangements.

1.2.2.1. Challenging the conventional models of collective action

Elinor Ostrom rejected the conventional models of the rational individual. For her, the theory of bounded rationality, which corresponds to a norm-based human behavior, is a better foundation for explaining collective action (Ostrom, 2007a). The behavioral theory of human action in social dilemmas indicates that "individuals pursue goals but do so subject to limited constraints of cognition and information processing, incomplete information, and the subtle influence of cultural predispositions and beliefs" (McGinnis, 2011, p. 170). Thus, individuals do their best according to what they know and the constraints they deal with. Moreover, they can learn and devise rules (Antona and Bousquet, 2017). They learn more complete and reliable information over time, especially in repeated situations (Poteete et al., 2010).

Certainly, the temptation to free ride is a universal problem, but Ostrom defends the idea that self-organization is possible through the creation of institutions for the management of CPRs. According to her, the trust that others will respect the rules, reinforced by a system of monitoring and sanction reduces the probability of free riding (Ostrom, 1990). Self-organization is defined as processes by which individuals directly involved in a collective

action problem devise by themselves institutions to organize their own actions (Ranville, 2016). To reach these conclusions, Ostrom carried out, in her book entitled *Governing the commons* published in 1990, an analysis based on case studies of self-organized CPRs that had a long-term success. She showed that there are arenas in which individuals can exchange, learn to trust each other, gather relevant information, observe the evolution of resources and create rules. In this situation, they manage to solve their social dilemmas without an intervention of a government nor privatization of the resource.

A CPR is defined by the criteria of non-excludability (i.e. it is difficult to limit the use of the resource to certain users) and rivalry (i.e. the consumption of a resource unit makes it unavailable for others) (Ostrom, 1999). These exclusion and rivalry criteria define four types of property presented in table 5.

Table 5. Types of goods.

	Non-rival	Rival
Non-excludable	Public goods	Common Pool Resources
Excludable	Club goods	Private goods

(source: Ostrom, 2003)

1.2.2.2. The role of social norms and heuristics in collective action

For Ostrom (1998), social norms are acquired through a learning process. They are seen as shared understandings, which specify what “actions are regarded by a set of persons as proper or correct, or improper and incorrect” (Coleman, 1990, p. 243). As norms are learned, they vary across individuals, across the types of situations they face and across time within any particular situation (Ostrom, 2007a). Crawford and Ostrom (1995) make a distinction between norm and rule. The rules are institutions more consciously fixed and specified by sanction mechanisms whereas the norms are implicit and do not specify the sanctions in case of deviance. Individuals frequently internalize shared norms, in which non-conformity involved both internal and external social costs. Internal costs are related to internal moral pressure (e.g. guilt or anxiety). External costs are related to external social pressure. If a norm is broken, a censorship is often done (Crawford et Ostrom, 1995; Ostrom, 2010).

Norms shared within a community, through their effects on behavior, can overcome situations of social dilemmas. Indeed, according to Ostrom (2005, p. 130) “a social norm especially in a setting where there is communication between the parties, can work as well or

nearly as well at generating cooperative behavior as an externally imposed set of rules and systems of monitoring and sanctioning”. However, adopting norms of behavior will not eliminate opportunistic behavior. The temptation for free ride is always present. The importance that the expected consequences will have on a person's decision, varies from one person to another depending on how this person values the conformity or deviance of a norm (Ostrom, 1990). This approach allows individuals to have a predisposition to act in a certain way. When moralistic strategies are common, punishment can be favored. Over time, there can be further adherence to shared norms and high levels of cooperation can be achieved without the need to engage monitoring and sanctioning to enforce rule conformance (Ostrom, 2000). In situations of opportunism, defined as “self-interest seeking with guile” (Williamson, 1975, p. 255), it is difficult to develop a stable and long-term commitment. In each group, there will be individuals who will ignore the norms, especially when potential benefits are high.

Cooperative behavior is based on social norms as well as on heuristics (Ostrom, 2000). The conventional model assumes that individuals have access to complete information, about all potential actions, outcomes and strategies of the others. However, in many situations, accurate information is missing or is costly to acquire. Thus, in most situations, individuals use heuristics that they have learned over time regarding responses that tend to give good but not always optimal, outcomes (Ostrom, 1998). With repetitions, individuals may use heuristics that get closer to optimal strategies. Nonetheless, heuristics perform less well in responding to rapid changes (i.e. sudden shocks, unpredictable conditions) (Ostrom, 2000; Poteete et al., 2010).

1.2.2.3. Collective action: a matter of trust, reciprocity and reputation

Ostrom (2007a) proposed a theoretical explanation of successful or unsuccessful collective actions based on the core relationship between trust, reciprocity and reputation. Trust, which is the expectation of one individual about the behavior of others, improves the likelihood of initiating cooperation. The question of trust arises only in a situation of uncertainty. It is therefore posed in relation to that of the risk. Trust can be established through proximity relations or based on abstract systems when relationships are anonymous and distant (e.g. geographical indications) (Giddens, 1990). Dupuy and Torre (2004) developed three kinds of trust:

- 1) community trust linked to family, religious or ethnic characteristics;
- 2) interpersonal trust that relies on mutual commitments between two individuals in face-to-face and repeated situations;

3) organizational trust that is an extension of interpersonal trust to the principle of collective action. The former kind of trust is of interest for the study of collective action, in which commitment takes two dimensions: (i) implicit which implies a repetition of the interactions, and (ii) explicit in a situation of prior commitment, formalized through internal rules.

Reciprocity leads to the adoption of strategies that include (1) identifying participants, (2) assessing their tendency to cooperate, (3) cooperating if others seem reliable, (4) refusing to cooperate with those who do not cooperate in return and (5) punishing those who betray trust (Ostrom, 1998, p. 10). Reciprocity contributes to the development of long-term obligations between individuals (Ostrom, 2007a). In a repeated situation, when some individuals initiate cooperation, others learn to trust them and are more willing to adopt reciprocity to cooperate in the future. The more individuals face retribution, the less likely they estimate that free riding is an attractive option. Thus, levels of trust and reciprocity are mutually reinforcing.

When individuals are known to use reciprocity, the more they gain a reputation for being trustworthy, the more trust develops. Reputation, understood as “the memory of the actors” (Dupuy and Torre, 2004, p. 9), is then acquired over time. It is one of the building blocks of trust. However, when some individuals begin to cheat, the reputation can be damaged. This can lead to a decrease in cooperation levels and generate a downward cascade leading to little or no cooperation, unless sanction systems are implemented (Antona and Bousquet, 2017).

Ostrom (2000) showed that some individuals have an initial propensity to follow norm of reciprocity to achieve collective action. Some individuals, called conditional cooperators, initiate more easily cooperation when they believe that others will reciprocate. In repeated situations, they can encourage other individuals to contribute. However, conditional cooperators can easily be disappointed with free riders. If others do not contribute, they will start reducing their own contributions. The absence of communication or sanction mechanisms, to stop the downward cascade, will lead to a decrease in levels of cooperation. Other individuals called punishers, who may also be conditional cooperators, are willing to punish free riders through sanction mechanisms. They can also give rewards for those who have contributed more than the minimum level (Ostrom, 2000). These two actors allow increasing cooperation and, therefore, increasing the benefits of collective action. They may also be determinant factors in the reduction of free riding (Ostrom, 1990).

1.2.2.4. Variables predicted to affect the likelihood of collective action

Multiple micro-situational variables affect the processes of learning and evoking norms of trust and reciprocity, and in turn, affect levels of cooperation (figure 5). Ostrom (2007a) and Poteete et al. (2010) defined several micro-situational variables affecting the level of cooperation; these are presented in table 6.

Table 6. Micro-situational variables of social dilemmas that affect the levels of trust and cooperation.

Variables that are likely to increase trust and positive outcomes in social dilemmas	
High marginal per capita return	If the marginal per capita return is high, individuals are more likely to recognize that their own contributions make more difference, and will hence contribute.
Security that contributions will be returned if not sufficient	If others do not contribute enough, individual's contribution will be returned. Each individual is then more willing to contribute.
Longer time horizon	When participants show a willingness to contribute early, this can lead others to contribute. The longer the time horizon involved the better the return on individual investment.
Capability to choose to enter or exit from a group	Cooperation is likely to increase when participants are able to enter where others show high levels of cooperation, and to leave when they are dissatisfied with outcomes.
Face-to-face communication	Face-to-face communication increases the likelihood that people will cooperate. It is probably due to the way words are expressed through facial and body expressions that help individuals to assess the trustworthiness of others.
Variables that have generated a diversity of outcomes	
Size of group	Increasing group size decrease prospects for successful collective action, because it is it more difficult to establish trust. However, there is a need to distinguish public good from CPR situations. In public good situations, increasing the number of participants tends to bring additional resources because of the non-subtractability characteristic of public goods. While an increase in the number of participants in the

	case of CPRs is negatively related to the realization of profits because of free riding and overexploitation of the resource.
Information about the average contributions is made available	Information on past overexploitation may lead some people to withdraw and harvest less, fearing of losing all future opportunities, while others may increase harvests.
Sanctioning capabilities	Sanctioning and rewards capabilities may increase joint returns.
Variable that is likely to decrease levels of cooperation	
Heterogeneity in benefits and costs	When some participants receive more benefits without paying more costs, others with fewer assets may be unwilling to contribute.

Poteete et al. (2010, p. 354-356)

Other research has identified further contextual variables as being favorable or detrimental to collective action (Agrawal, 2002, Ostrom, 1990; Poteete and Ostrom 2004).

Among those proposed are:

- The way individuals are linked: individuals linked in a network by cyclical triads (or any similar unidirectional links) are more likely to contribute to the well-being of each other than individuals in an undifferentiated group setting can expect to free ride for a longer period of time.

- Heterogeneity of the participants: homogeneity may facilitate collective action because it promotes trust or reflects common interests. However, there are different forms of heterogeneity that will shape the prospects for collective action in different ways: (1) heterogeneity in endowments; (2) political heterogeneity; (3) wealth and entitlements; (4) cultural heterogeneity; and (5) economic interests.

- Knowledge on the resource system.

- The dependence of the group on the goods.

- The presence of leadership.

However, it is not possible to link all of the variables identified below in one model given the large number of variables. Many of them depend for their impact on the value of other variables (Ostrom, 2007a).

Moreover, the broader institutional context of a situation affects the structure of the situation of the actors at the micro level and consequently the core relationship or directly the norms adapted by the individuals (figure 5).

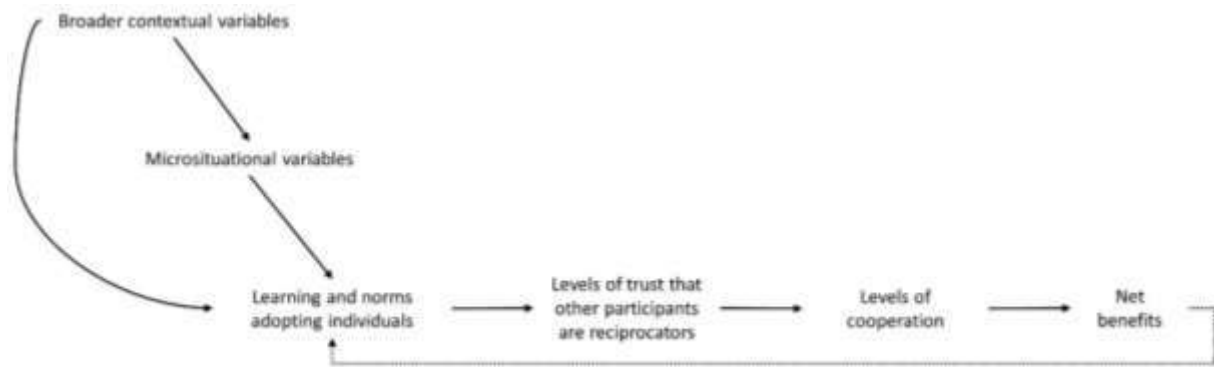


Figure 5. Micro-situational and broader context variables of social dilemmas affect the levels of trust and cooperation (source: Poteete et al., 2010, p. 227).

1.2.3. An institutional approach to study collective action

One of the central questions of Ostrom is how a group of individuals can organize themselves to obtain continuing joint benefits without external assistance when they all face the temptation of free ride. Indeed, according to Ostrom (1990), the success of collective action depends markedly on the capabilities of the group to supply their own institutional arrangements, which should rely on one side on rules for the resource management and, on the other side, on effective monitoring and sanction systems (Agrawal, 2001).

1.2.3.1. What is an institution?

Institution refers to rules, which correspond to “shared understandings among those involved that refer to enforced prescriptions about what actions are required, prohibited, or permitted” (Ostrom, 2011, p. 17) and to organizations (Ostrom, 2007b). According to North (1990, p. 97), institutions have been “devised by human beings to create order and reduce uncertainty in exchange”. They imply that a group of individuals have developed shared understandings that actions in particular situations must, must not, or may be undertaken and that sanctions will be taken against those who do not conform (Crawford and Ostrom, 2005; Ostrom, 1990).

Rules affect the structure of a situation in which sets of action and outcomes are specified. All rules are nested in another set of rules that define how the first set of rules can be changed. This nesting of rules within rules operates at several levels. Thus, institutional arrangements correspond to sets of rules, including monitoring and sanctioning mechanisms, and organizations. Ostrom (2007a) distinguishes three levels of rules conditioning actions and outcomes:

- Operational rules directly affect day-to-day decisions made by the participants.
- Collective-choice rules outline who is eligible in changing the operational rules.
- Constitutional-choice rules identify who is eligible in designing the set of collective-choice rules that in turn affect the set of operational rules.

1.2.3.2. Analyzing self-organization

Self-organization corresponds to the processes by which individuals directly involved in a problem of collective action devise by themselves institutions to organize their actions (i.e. operational rules) (Ranville, 2016). That does not necessarily mean creating an organization, considered as a network of formal relationships, which results from the process of organizing (Ostrom, 1990).

Self-organized groups face different social dilemmas. The first-order dilemma concerns the regulation of the use of the resource since everyone would prefer not to reduce their own benefits and that others reduce their use of the resource. It corresponds to the free riding problem. The second-order dilemma concerns the respect or not of the rules devised to resolve the first-order dilemma (Antona and Bousquet, 2017). Self-organized systems are adaptive and rules are potentially subject to change (Ostrom, 1990; 1999). Indeed, individuals adapt their rules according to the context, by a trial-and-error process (Ostrom, 1998; Ranville, 2016). The capacity of individuals to supply rules to extricate themselves from various types of dilemmatic situations varies from one situation to another. Ostrom (1990) showed that individuals are able to supply a huge diversity of institutional arrangements to overcome collective-action problems. On one hand, devising own rules allows a better flexibility and responsiveness, and consequently a better resilience of local communities (Poteete and Ostrom, 2004). Moreover, institutions designed by the participants themselves are perceived legitimate and fair. On the other hand, institutions designed by external authorities can hardly give optimal solutions, because designing the right institutions is a difficult, time-consuming and conflict-invoking process. This process requires reliable information on the local situation as well as knowledge on culturally accepted rules (Ostrom, 1990).

From different case studies, Ostrom (1990) identifies eight design principles that characterize long-term CPR institutions, presented in table 7.

Table 7. Design principles illustrated by long-enduring CPR institutions.

1. Clearly defined boundaries
Individuals or households who have rights to withdraw resource units from the CPR must be clearly defined, as should the boundaries of the CPR itself.
2. Congruence between appropriation and provision rules and local conditions
Appropriation rules restricting time, place, technology, and / or quantity of resource units are related to local conditions and to provision rules requiring labor, material, and / or money.
3. Collective-choice arrangements
Most individuals affected by the operational rules can participate in modifying the operational rules.
4. Monitoring
Monitors, who actively audit CPR conditions and appropriator behavior, are accountable to the appropriators or are the appropriators.
5. Graduated sanctions
Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and context of the offense) by other appropriators, by official accountable to these appropriators, or by both.
6. Conflict-resolution mechanisms
Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials
7. Minimal recognition of rights to organize
The rights of appropriators to devise their own institutions are not challenged by external governmental authorities.
8. Nested enterprises
Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

Source: Ostrom (1990, p. 90).

From these eight design principles, Ostrom (1990) exposed different cases of robust CPR institutions that survived over long period. She exposed the cases of management of high mountain meadows and forests in Switzerland and in Japan, and irrigation systems in Spain and Philippine. Ostrom also showed cases of self-organization failure because of the lack of some of the principles, as for example in the case of groundwater basins in California or fisheries and irrigation systems in Sri Lanka.

1.2.3.3. The role of governments in self-organization

Nevertheless, governments (supra national, national, subnational levels) are also important in potentially coping with problems of collective action. According to Ostrom (1990), localized institutional arrangements and larger institutional environment should be complementary. In fact, polycentric systems, a superposition of interacting decision-making centers, are more favorable to self-organizing processes (Ostrom, 2000). Governments can have a positive influence to enhance the ability of local individuals to engage in effective institutional design, for example by facilitating access to information, by providing conflict resolution arenas or mechanisms to strengthen the sanctions and monitoring mechanisms supplied by the group (Ostrom, 1990; 2000). Any policy that tries to improve levels of collective action, in order to overcome social dilemmas, should enhance the level of trust by participants (Ostrom, 2010). In general, governments must at least recognize the legitimacy of the local institutional arrangements.

However, larger institutional environments can also have a negative influence on self-organizing systems. For example, governments may threaten self-organized systems through the imposition of uniform rules, especially when they are barely able to carry out controls and sanctions. The low degree of external controls and sanctions makes some players cheat, taking relatively low risks of being caught (Ostrom, 2000). In addition, Ostrom (2000) identified various other threats to achieve collective action. This includes rapid change in technology; transmission failures from one generation to the other of the operational rules; international aid that does not integrate local knowledge and institutions; and too frequent external source of help.

1.2.4. Transposition of the Ostrom's model of collective action to the LAS

In this research, I am interested in understanding collective action in LAS for the territorial quality differentiation of mountain cheese. Thus, I question the possibility of applying Elinor Ostrom's approach to collective action to this research.

1.2.4.1. Common features and differences

In order to test the ability of the framework of collective action proposed by Ostrom to explain the cooperative behavior among actors within LAS, I suppose that there are common points between LAS and CPRs, mainly based on norms and institutions. First, as with CPRs, collective action within LAS also requires the establishment of trust and reciprocity

relationships between local actors to implement common projects, in which situational variables play a central role. Then, LAS should have defined boundaries that clarify the area of production and therefore the involved actors. After that, we suppose that it is necessary to set endogenous collective rules, characteristic of self-organization, in order to define production rules and implement monitoring mechanisms and gradual sanctions that ensure quality of the product, and protect and enhance the reputation. In addition, institutional frameworks defined at higher institutional levels should support collective action (e.g. legislative frameworks authorizing production, for certification or defining cooperative status). Thus, in both LAS and CPRs, it seems necessary to have an institutional complementarity between the different levels.

However, there are some differences between LAS and CPRs. In fact, the social dilemma in LAS is different from CPRs. For CPRs, individuals are interdependent in the use of the resource and must organize themselves to avoid overexploitation. However, for LAS, the shared resource is the result of collective action. In fact, the differentiation of the product is a problem of collective action since the individuals must cooperate to produce collective benefits that they could not produce through an individual action. In LAS, two types of goods are produced: the food products (the cheese in our case) which are private goods; and the reputation, which is a club good (Torre, 2002) (table 5). The reputation is intangible and is linked to the anchorage in the territory. It presupposes a positive public opinion perceived of the product as having a certain quality which consumers associate with its geographical origin. The quality is related to intrinsic attributes (i.e. biophysical) and extrinsic attributes (i.e. symbolic and cultural) (Barjolle et al., 1998). The reputation is at the origin of the TQR (Mollard, 2001).

1.2.4.2. Modelling of the reputation as a club good

The club goods are characterized by the exclusion of benefits and by a partial non-rivalry (a unit can be consumed by an individual without diminishing the opportunities for consumption of others). Thus, the reputation consumed by one of the producers does not harm that of the neighbor (Buchanan, 1965). This type of goods is in fact common goods consumed within a community of limited size.

According to Torre (2002) and based on the work of Buchanan (1965), the main characteristics of club goods are the following:

- The consumption of club goods is voluntary. The utility gained by a club member in the

consumption of the good must be greater than the utility associated with non-members.

- Club goods generate crowding and congestion phenomena, which result from their use by too many members of the club. This leads to a partial rivalry of benefits as the size of the club increases.

- Club goods are consumed by an exclusive group, consisting of a finite number of members. It is based on an exclusion mechanism at the entrance, which reduces the congestion effect. The utility from the consumption of a club good depends on the number of other consumers of the same good, so that the size of the club must be integrated into the utility function of the consumer of the club good.

In clubs, members are free to leave. However, free ride remains the major problem due to collective consumption and shared responsibilities. Nonetheless, clubs tend to have a small size; it seems therefore less difficult to cope with free riding (Anderson et al., 2004).

The club goods balance between marginal individual benefits and costs. The equilibrium in club size is reached only when the marginal benefits from having an additional member are equal to the marginal costs from adding a member. In order to know the optimal size of the club, it is necessary to examine the marginal rate of substitution of the group size compared to the private goods produced, while keeping the same level of satisfaction of the members. This expresses the rate at which a producer will agree to waive some units of private goods in exchange for the membership of an additional member, while maintaining the same reputation (Torre, 2002).

Each member of the group benefits from the presence of the other members, because it allows dividing the total cost among the members of the community to produce the common goods. This corresponds to the efforts to establish and maintain a reputation (e.g. means of communication, certification) and to governance structures (e.g. concertation, conflict resolution, controls, sanctions). As showed in figure 6, it is necessary first to obtain a critical number of producers, below which the benefits of a collective action are too low compared to the costs. However, from a certain size, the collective character of the reputation leads to a partial rivalry of the gained benefits, which has the consequence of devaluing the reputation of the product. From a certain threshold of congestion, the use of the club good (i.e. the reputation) by an additional member will then negatively affect the utility function of all members of the club.

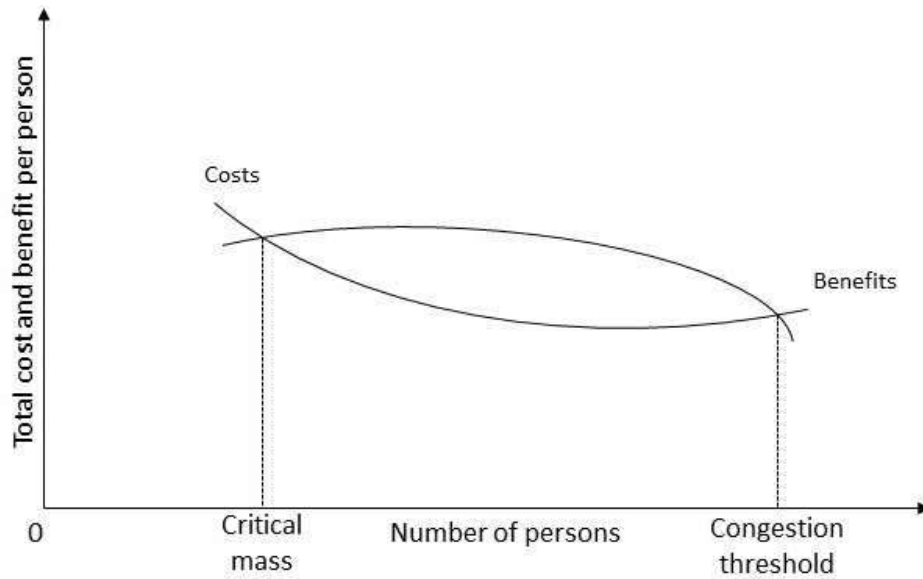


Figure 6. Total cost and benefit per person according to the number of persons of a club (source: Torre, 2002).

Conclusion

Ostrom conducted numerous studies on self-organized communities managing CPRs to identify the conditions that allow a sustainable management. From her research, she developed a framework of collective action, based on norms and multi-level institutions. The application of this framework appears valuable to study collective action in LAS for the territorial quality differentiation of mountain cheese. In this case, the common goods correspond to the reputation of the cheese linked to a specific territory. This framework will be hybridized with the territorial proximity and territoriality frameworks to have a throughout understanding of collective action within a specific territory in the context of mountain cheese LAS. In the next section, I provide definitions of mountain and outline the role of grasslands and related grazing livestock systems for a sustainable development in mountains.

1.3. Grazing livestock in mountains

Introduction

Grazing livestock, often linked to cheese production, is a common activity in many mountains of the world as it makes use of non-arable and marginal areas. This activity ensures multiple economic, social, and environmental functions. In addition, cheese represents an essential source of food and income for mountain populations. It allows the postponement of consumption and marketing of the milk, while reducing the constraints associated with its transport and preservation. At the same time, the quality and distinctiveness of mountain cheese, most of the time made from raw milk, confer an added value to milk and often becomes an identity object (Delfosse, 2006). The present study is part of a research on mountain areas. It appears then necessary to bring conceptual bases on mountains and the associated grazing livestock systems. This section brings a definition of mountains, presents the actual challenges for mountains and outlines the main global policies that have been implemented for mountain sustainable management until today. Then, it highlights the role of mountain grasslands and related grazing livestock systems for a sustainable development in mountains, with a focus on their multifunctionality.

1.3.1. Introduction on mountains

This first section presents different definitions of mountain. Then, it exposes the main challenges that mountains are facing. Last, it provides the main global policies on mountains that have been implemented until today.

1.3.1.1. What is a mountain?

There is no universally agreement on the definition of what a mountain is (Körner et al., 2005; Spehn et al., 2010). Definitions vary if subjective (i.e. place which has meaning for local people) or objective (i.e. altitude, slope, ruggedness) criteria are selected (Price, 2015). Focusing on objective criteria, the Global Mountain Biodiversity Assessment network (GMBA) defined mountains by ruggedness of terrain only (i.e. maximal elevation difference among neighboring grid points), irrespective of elevation (Körner et al., 2011). According to this approach, 12 % of the world's land surface is mountains (figure 7) which host 5 % of the world population (386 million people) (Körner et al., 2017). From another perspective, the United Nations Environment Program–World Conservation Monitoring Center (UNEP-WCMC) developed an approach for classifying mountains based on altitude and ruggedness

(Kapos et al., 2000). The FAO (2015), which uses this typology, estimated that mountains cover 24 % of the world's land surface and are home for 12 % of the world population (915 million people).



Figure 7. The global distribution of mountains according to the GMBA approach (source: Körner et al., 2017).

1.3.1.2. Why mountain matters?

Mountains are important issues for sustainable development (Price, 2004; Price and Kohler, 2013). Not only for their importance in terms of surface or population, but also because half of humankind depends in one way or the other on mountain resources (Bierman-Lytle, 2015; Körner et al., 2005).

However, world mountain areas are facing several challenges. First, mountains are the reserve of many resources. They are the “water tower” of the world: 80 % of freshwater comes from mountains (Price, 2015; Viviroli, 2007). This water is also an important source of hydropower, which provides almost 20 % of global electricity (Price, 2007). Moreover, mountains play a protection role by storing rainfall, regulating river flow and limiting erosion (Price, 2007). Additionally, mountain agriculture provides subsistence for about half a billion people (Bierman-Lytle, 2015). And last but not least, mining activity is concentrated in mountains, which provide most of the world’s strategic ferrous and precious metals (Körner et al., 2005; Price, 2015).

Furthermore, greater biodiversity exists in mountains than in lowlands (Körner and Spehn, 2002). This is due to less anthropogenic pressure and to the compression of climatic

life zones with small-scale habitat diversity caused by different climates (Körner et al., 2005). Mountains support around one-quarter of terrestrial species diversity, with nearly half of the world's biodiversity hotspots (Bierman-Lytle, 2015; Spehn et al., 2010). Moreover, many of the food staples were domesticated in mountains (e.g. potato, tomato, corn, wheat), which are today part of many diets in the world. Mountains also provide a high diversity of timber and non-timber resources (e.g. medicinal plants and mushrooms) (Bierman-Lytle, 2015; Byers et al., 2013; Price, 2007).

General trends in mountains, compared to lowlands, are higher rates of depopulation, lower population densities and greater remoteness from decision centers (Körner et al., 2005). However, urbanization is also affecting mountains. Today, around a third of the mountain population lives in urban areas. Rapid growth of the urban population has led to the development of megacities such as Mexico City and Jakarta (Gardner et al., 2013; Price, 2007). Mountains are generally less provided in transport infrastructures as well as information and communication technologies (Kohler et al., 2004). Moreover, mountain people have generally less access to educational and medical facilities (Price, 2015). Nonetheless, density of access differs widely between countries of the Global South and North (Price and Kohler, 2013).

A high cultural diversity is found in mountains (Bierman-Lytle, 2015; Byers et al., 2013; Körner et al., 2005), marked by a wide variety of languages, clothes, food, celebrations, legends, beliefs, songs, dances. For many societies, mountains have spiritual and sacred significance. They often represent a strong symbol for local populations (Byers et al., 2013; Price, 2015). This high diversity of cultures also includes traditional agricultural knowledge, which generally promotes sustainable production systems (Bierman-Lytle, 2015). Moreover, scenic and recreational landscapes, clean air as well as adventure make mountains target regions for tourism, which is often of great importance for their economies (Bierman-Lytle, 2015; Körner et al., 2005; Price and Kohler, 2013;). However, tourism can have also negative environmental and cultural consequences (Byers et al., 2013).

Nonetheless, highland communities suffer from higher poverty rates and food insecurity (Price and Kohler, 2013; Körner et al., 2005). According to the FAO (2015), the number of mountain people considered vulnerable to food insecurity increased by 30 % between 2000 and 2015 (from 253 million to 329 million). Mountains are often the scene of conflicts of which resource uses, climate change and drug cultivation are frequently responsible for. Moreover, mountains are often located at the borders and are refuges for minorities and

political opposition (Körner et al., 2005). The isolation and often extreme terrains put these areas out of the range of traditional security forces (Price, 2015; Price and Kohler, 2013).

At last, mountains are climate change hotspots, with rapidly increasing temperatures and particularly changing precipitation (Egan and Price, 2017; Kohler and al., 2014). Most glaciers are melting; some have disappeared, affecting the security of water supplies (Vaughan et al., 2013). The melting of permafrost has consequences in many ways (e.g. landslides, erosion, infectious diseases and changes in agricultural patterns) (Byers et al., 2013). In fact, mountains include some of the most fragile ecosystems. The steep slopes and shallow soils can for example accelerate erosion, landslides and desertification. Yet mountains also have a major potential for offsetting global change, due to their potential as carbon sinks, through ecosystem restoration and mitigation of greenhouse gas emissions *via* grazing practice, land management, fire management and production of renewable energy (hydroelectricity) (Körner et al., 2005; Price, 2015). Moreover, land use pressure puts mountain ecosystem integrity at risk in many parts of the world. Industrial use, deforestation, overgrazing and inappropriate cropping practices lead to irreversible losses of soil and ecosystem function, with increased environmental risks in mountain, but also in subjacent lowland areas (Egan and Price, 2017; Körner et al., 2005).

In sum, human well-being depends widely on mountain resources. Consequently, sustainable management in mountains appears as one of the main imperatives of this century. This requires therefore the recognition of their importance by governments and the implementation of specific policies.

1.3.1.3. Global policies for mountains management

During the last decades, mountains have risen to the forefront of global environment and development debates (Debardieux and Price, 2008; Körner et al., 2005; Price et al., 2004; Price, 2015). The inclusion of Chapter 13 entitled *Managing Fragile Ecosystems: Sustainable Mountain Development* in the Agenda 21, issuing from UN Conference on Environment and Development in 1992 was an important starting point (Price and Kohler, 2013). In 2002, the UN General Assembly proclaimed that it would be the International Year of Mountains. During the same year, the mountain partnership was launched by the UN, which is an international voluntary alliance, gathering 78 countries, and dedicated to improving the lives of mountain people and protecting mountain environments. In 2005, the Millennium Ecosystem Assessment (MEA), which assesses the impact of human activities on natural ecosystems, was initiated

with a special chapter on mountains (Price, 2007). Last, in 2015, the Agenda 2030, that was adopted by the general assembly of the UN gathers seventeen goals for sustainable development, including sustainable mountain development (Price, 2015).

Many European countries have long used their own definitions of mountain for planning and policy purposes that resulted in a variety of definitions. Nonetheless, the inclusion of mountain in specific development programs at the EU level required a uniform definition of mountain. The WCMC global delineation was chosen as the basis for a European delineation, with some adaptation to the European context (Price et al., 2004). According to the actual definition, 41 % of the EU area is mountains and 19 % of the EU population lives in mountains. In Brazil, no specific policy for sustainable management in mountains has been implemented to date. According to the WCMC definition, 16 % of the Brazilian area is mountains.

1.3.2. Livestock grazing in mountains: a stake for sustainable development

This section outlines the role of grasslands and related grazing livestock system for a sustainable development in mountains. It also highlights the multifunctionality of mountain grasslands.

1.3.2.1. Mountain grasslands and grazing livestock systems

Grasslands represent the world's largest terrestrial ecosystem. They cover between 25 and 45 % of the world area, depending on how these lands are defined (figure 8) (Reid et al., 2008; Steinfeld et al., 2006; Suttie et al., 2005). Grassland corresponds in a large way to vegetation dominated by grasses and other herbaceous plants, also including a small amount of shrubs. They contribute to the livelihoods of more than 800 million people (Steinfeld et al., 2006; Suttie et al., 2005).



Figure 8. Distribution of grasslands in the world (source: Erb et al., 2007).

Grasslands are the most important mountain ecosystem after forests (Erb et al., 2007). They contribute to agricultural production through livestock grazing in mountains that otherwise would go uncultivated (Bengtsson et al., 2019; Cunha and Price, 2013). In fact, because of steep slopes, poor and thin soils and / or extreme climatic conditions, mountains can be used for croplands with difficulty. Livestock grazing may occur in various types of grasslands ranging from desert, semi-desert to steppes, savannas, tundra and humid grasslands that are grazed with different animal species (cattle, sheep, goat, llama, reindeer, yak, etc.) (Reid et al., 2008). Most of the mountain grasslands below the timberline are semi-natural and where humans have contributed in one way or another to the formation of these ecosystems (e.g. grazing, fire, deforestation). They are a result of livestock grazing that create and maintain open habitats (Rodríguez-Ortega et al., 2014). Without human influence, these habitats, except for natural grasslands, would quickly revert to forest vegetation (Mitchley et al., 2007).

Cunha and Price (2013) described three grazing livestock systems in mountains, depending on environmental and cultural factors:

- 1) The nomadic pastoralism in which a small group of people with their animal migrate between summer and winter pastures with no permanent settlement. They follow elevation gradient along the seasons to seek precipitations regimes that favor grassland growth. Nomadic pastoralism is mainly found in Africa and in the Middle East. Nomads are interdependent with sedentary farmers to exchange products. Thus, nomads sell dairy products, meat, skin or wool and buy foodstuffs and manufactured items that they cannot produce themselves. However, today there are increasing land use conflicts between nomads and farmers due mainly to climate change (Benjaminsen, 2016; Cabot, 2017).

2) The transhumance requires migration between winter and summer pastures, similarly to nomadic pastoralism. However, the communities remain in permanent settlement to produce crops and graze animal locally. Moreover, shepherds or families move the animals on higher pastures in summer, where grazing rights are often collective. During winter, the animals are most of the time fed on summer hay and grain. Transhumance is common in Europe, North Africa, Himalaya and Andes. Furthermore, the UNESCO recognized transhumance in the Mediterranean and in the Alps as intangible cultural heritage in 2019 (UNESCO, 2019).

3) The mixed grazing with farming is similar to transhumance. However, it is more localized (i.e. same valley or mountain slope) and each evening the herd returns to the settlement. Farmers move the livestock to highland pastures, not because of a scarcity of pasture fodder in summer, but to enable the cultivation of the fields and the haymaking. This form of grazing is mainly found in Central Asia, Europe and Andes.

Today, grazing livestock and their associated way of life are declining in many mountains, especially in Europe. In fact, in the dominant model logic, mountain agriculture can difficultly compete with other more productive areas. This leads to an abandon of highlands and consequently results in a loss of biodiversity, typical landscapes as well traditional know-how (MacDonald, 2000; Mitchley et al., 2007; Schermer et al., 2016; Spehn et al., 2010).

1.3.2.2. Mountain grassland multifunctionality

Mountain grasslands are highly multifunctional and provide important ecosystem services to humans, identified by the MEA (2005). This ecosystem has important economic, environmental, cultural and aesthetic functions (Rodríguez-Ortega et al., 2014).

From a production point of view, the primary function of these grasslands is to provide fodder for grazing animals. The importance of the forage for the quality of animal products is well established (Martin et al., 2005; O’Callaghan et al., 2016; Piasentier and Martin, 2006). Indeed, it has a clear positive impact on the nutritive quality of the products. Moreover, the intrinsic quality is related to the botanical biodiversity of the mountain pastures, which associated with a diversity of plant influence positively the flavor of the products (Bergamaschi and Bittante, 2018).

From an ecological point of view, mountain grasslands are among the most species-rich ecosystems (Bengtsson et al., 2019). They play an important role in landscape management, biodiversity conservation or natural risk prevention (e.g. avalanches, fires, landslides) in

mountains, and are also involved in climate (e.g. carbon storage) and water regulation as well as erosion prevention (Bettagliini et al., 2014; Rodríguez-Ortega et al., 2014; Schirpke et al., 2013).

From a socioeconomic and cultural point of view, mountain grasslands help maintaining the viability of local populations. Indeed, grazing livestock in mountains is an important source of livelihood and employment (FAO, 2019). The diversity in landscapes and species plays an increasingly important role in recreational activities and therefore in attracting tourists (Rüdisser et al., 2019; Schirpke et al., 2016). This creates an important additional income to mountain regions. Moreover, grasslands have high spiritual values in pastoral cultures: they have a central place in maintaining the socio-cultural traits of these pastoral communities and in the preservation of traditions and know how (Cunha and Price, 2013).

Conclusion

Mountains are fragile ecosystems which are facing today many challenges because of global changes. This requires therefore the implementation of specific policies to ensure their protection. In mountains, livestock grazing is a common activity which provides many benefits for human wellbeing. Mountain grasslands are an essential element of sustainable farming systems. And are therefore necessary to preserve and value this activity. This appears to be a crucial point to ensure a sustainable development in mountains.

Chapter 2. Research design



Figure 9. Beginning of the geographical area of the Tome des Bauges PDO, in the Bauges massif, French Alps (source: own photo, 2018).

Introduction

This chapter deals with the research design which is the strategic plan implemented to answer the research question. It involves the approaches, the theories, and the set of methods of data collection and analysis used for the study (Scott, 2014). The first part of this chapter gives an overview over the conception and operationalization of the research. The second part displays the methods employed in the articles according to each specific objective of the research. However, this part does not aim at explaining in details the methods used in this study, as these are already described in the articles integrated in appendix to the thesis.

2.1. Research conception and operationalization

2.1.1. Definition of the research

I was born and raised at the border between the Beaufort territory and the Tome des Bauges territory in Savoy, in the French Alps. From an economic point of view, but also from a cultural point of view, cheese has always had a central place for the people of Savoy. The organizational capacity that the local actors developed to maintain and valorize their activity have always fascinated me. In 2015, I had the opportunity to work at the Beaufort defense union, during which my interest in understanding better these agrifood systems further increased. It was this thirst for knowledge and the willingness to participate in the valorization of these systems that pushed me to work on this subject as part of my PhD.

I started my thesis in March 2017 at the Institute of Geography of the UIBK, in partnership with the CIRAD, at the research unit GREEN. Since the beginning, I had a fairly fixed idea of the research theme. It was to understand the determinants of the organizational capacity of the actors in mountain cheese production systems for the maintenance and valorization of their cheese. Nevertheless, the theoretical approaches and methods remained to be specified. After my first bibliographic readings, the choice of the territorial approach was made quickly. However, when writing my first article I used the notion of value chain because I did not know the concept of LAS before. Then, the concept of LAS was preferred in the following articles. Indeed, the value chain approach, which describes the sequence of activities implemented from the conception until the marketing of a product does not allow to include the social, cultural and identity dimensions linked to the anchorage of such agrifood systems in specific territories.

Later, I had to develop frameworks and methods to respond to my research question. First, I moved towards the concept of **social capital** and the qualitative measurement of the strength of the links between the actors involved in the production. This approach was used in the first article of this thesis. Through this viewpoint, I wanted to understand the process of territorial innovation emergence, mainly organizational and institutional. However, I quickly faced limits related to the concept. The main limit that I faced was linked to its definition. In fact, social capital, although it is widely used, is a multi-faceted and contentious concept. For some authors, social capital is a resource accessible to an agent thanks to its network of relationships (Bourdieu, 1980; Lin, 2001). It is therefore considered as an individual property; whereas for others, it corresponds to the structure of social relations and the norms that enable people to act collectively (Coleman, 1990; Putnam, 1993; Woolcock and Narayan, 2000). After that, the analysis of social capital is often restricted to the measurement of the strength of the links, which limits the prospects for research (Burt, 1992; Granovetter, 1983). Last, this concept has already been widely used in scholars. I wanted my research to approve a more original contribution to the understanding of the organization in LAS, including the territorial dimensions to the analysis. These are the reasons why I chose to direct me towards other approaches.

Following the second fieldwork, it appeared to me that **collective action through a territorial perspective** was the central element of my thesis. Thus, I redirected my research into the study of collective action within mountain cheese LAS. To achieve the objective, I mobilized three different frameworks: the **CPR, territorial proximity and territoriality frameworks**. On one hand, the **CPR framework** proposed by Elinor Ostrom (1990) allows deepening the normative and multilevel institutional dimensions of collective action, and therefore the governance structures. In fact, this framework allows considering the capacity of self-organization of the local actors through the design of localized institutional arrangements and the establishment of shared norms; while considering the central role of support of higher institutional levels to localized collective action. On the other hand, I articulate other frameworks to integrate further territorial dimensions. Thus, I used the **territorial proximity** approach to integrate the geographical (i.e. material dimension) and organized (i.e. organizational and ideal dimensions) relationships into the analysis of collective action (Torre and Rallet, 2005). I also used the **territoriality** approach, to consider the role of identity and feeling of belonging in collective action, that is to say the ideal dimension of territory (Di Méo 2016; Raffestin, 1982).

In return, the thesis also aims to deepen understanding of how collective action can contribute to **territorial development**. For this, I provide economic indicators and also social, cultural and environmental ones in the discussion chapter, to compare the collective action processes and their impact on territorial development outcomes between both case studies.

The figure 10 shows how the study is structured and which frameworks and indicators are mobilized to meet the research objectives.

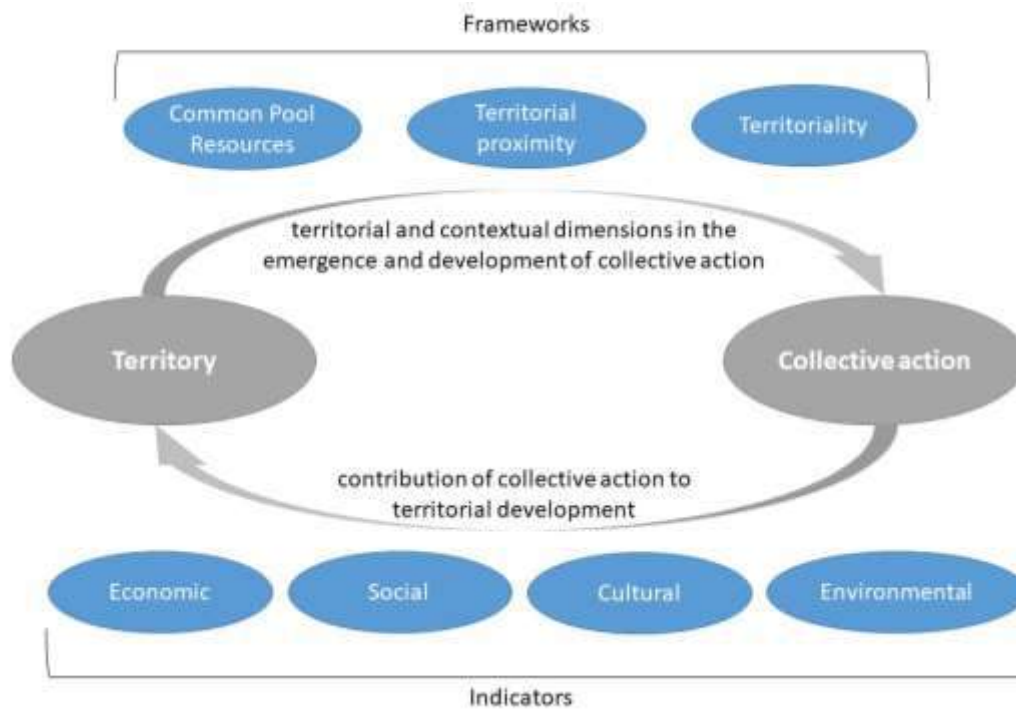


Figure 10. Structure of the research (source: own elaboration).

2.1.2. Case studies

The research was conducted in two different case studies, which are the Campos de Cima da Serra (CCS) in Brazil and the province of Trento in Italy. Before beginning my PhD, I lived in Brazil for one year and a half, gaining experience made me want to pursue my research in this country. Thanks to contacts at the PGDR of the UFRGS, I got interested in the Serrano cheese in the CCS. The university gave me an important technical support. I accessed research on the case study and some researchers provided me contacts of local actors. My first two years of thesis were dedicated to this case study. I conducted three sessions of fieldwork of two months each. This period of research was long because it is on this case study that I have defined the approaches and methods of my thesis. Moreover, I needed time to understand

the organization of the Serrano cheese production, as it is mainly informal and the Brazilian legal frameworks are complex.

Regarding the second fieldwork, I initially suggested a study area in Tyrol, Austria given its proximity to the UIBK. However, in January 2019, I applied for a grant at the DAFNAE of the University of Padua (UNIPD) to cope with budgetary constraints. This enabled me to continue my PhD. At the UNIPD, I participated in the SMartAlp project funded by the Rural Development Program (RDP) of the province of Trento. My mission was to understand the local stakeholders' and tourists' perceptions of ecosystem services provided by summer pastures (Pachoud et al., 2020). The province of Trento is characterized by a strong organization with regard to the production and valorization of its traditional cheeses. This case study thus came as an evidence for my second case study. Moreover, I learned a lot about the province from some researchers at the UNIPD. I dedicated the last fifteen months of my thesis to studying the province of Trento. I conducted one session of fieldwork which lasted for two months and five short visits made possible due to the proximity to Innsbruck.

The two cases studies differ widely (e.g. organizational structure, legal situation, cultural attributes) but present at the same time some similarities (e.g. growing demand for cheese, PDO certification, family farming, intensification issue and land use change). This allows drawing a comparison between both case studies in the discussion; however, it may seem that the Brazilian study case is given more prominent space in the thesis. I spent more time to study this case and published four articles, whereas I wrote only two articles on the Italian case study. Nevertheless, I think that the two cases provided an equally important value to my research, at least for the two first specific objectives and the issue related to the feeling of belonging of the third specific objective. In fact, the fieldwork in Italy was faster because of the research design since the approaches and the methods of data collection and analysis were already defined during my stay in Brazil. The methods of data collection and analysis were repeated in the Italian study, with some adjustments according to the specificities of the context. In addition, the case study was more familiar to me regarding legislative frameworks. At last, the literature on the Italian case was much richer. The methods and the contents of each article are exposed in the following part.

2.2. Short focus on the methods

With the aim of the research in mind, I elaborated three specific objectives and for each of them several hypotheses. The thesis is presented in six articles in a cumulative dissertation. The different objectives, related hypothesis and articles are presented in the introduction (tables 1, 2, 3 and 4). In order to respond to the research objective, I implemented qualitative and quantitative methods which I describe in the following section.

2.2.1. Focus on the first specific objective

The first specific objective is to “analyze the territorial governance forms and the deployment of collective strategies to differentiate the cheese”. To respond to this goal, I explored at the territory level how collective action emerged and developed over time, with a specific attention on the institutional and organizational arrangements and the leading actors of this construction.

On both case studies, I used qualitative methods, which are semi-structured historical interviews with producers coupled with semi-structured interviews with key actors of the LAS such as experts (e.g. producers, extension or advisory services, local and state authorities, inspection services, Nature Park, tourism promotion agencies). I also consulted historical and scientific literature as well as legislative texts.

The first paper analyzes the development of cheese production and organization over time in the CCS. However, it uses the value chain and social capital concepts. Indeed, this article corresponds to the first publication when the research design was still not defined. The aim of this article is to study the role of social capital in the balance between maintaining traditions and the emergence of territorial innovations, through a historical analysis. The analysis allows, even if the approach was different, understanding how the production is organized over time, i.e. the definition of institutional arrangements and the emergence of collective organizations over time and the leading actors.

In the second paper, I focus on the actual territorial governance structures in the CCS. In fact, the actual governance structure requires a more detailed analysis, because the CCS are located between two states, which leads to different political contexts and governance structures. The article makes a comparison of the efficiency of territorial governance in both states, through a qualitative assessment from eight indicators. The indicators are adopted from

a method developed by the secretariat of territorial development of the Brazilian Ministry of Agrarian Development (MDA).

The third paper concerns the development of collective action and the underlying governance structures in the province of Trento over time. The article focuses more particularly on the institutional and organizational arrangements implemented until today with a focus on the leading actors and trust relationships.

Despite a different focus for the first article, the methods of data collection and analysis have been much the same. This makes it possible to compare the dynamics of collective action over time, and the underlying territorial governance structures and implemented strategies for cheese differentiation, for the two case studies.

2.2.2. Focus on the second specific objective

The second objective analyzes relational processes within collective organizations. The analysis is presented in two papers, one on the Brazilian case and one on the Italian case.

The relational analysis is conducted within two specific organizations; and because the organizational structure differs between both case studies, the nature of these organizations also differs. In the CCS, I study a producers' association, which involved producers, extension agents, inspection veterinarians and agriculture secretaries of two municipalities, while in the province of Trento, I analyzed a dairy cooperative including producers from five municipalities only. I chose these two organizations because they present better results in terms of participation or actions implemented in the case of the producers' association or in terms of economical results in the case of the dairy cooperative, compared with other organizations of the study areas.

Nonetheless, I use the same methodology in both articles, combining quantitative and qualitative methods. Concerning the quantitative method, I conducted a social network analysis (SNA) of the advice structure among the members. To collect the data, I used the roster method aiming at asking the producer members to cite the names of individuals who advise them on how to improve their farming and / or cheese making activities using the list of all the participants. To analyze the data, three kinds of approaches are used (Pachoud et al., 2019):

- A positional approach aims at characterizing the position of each individual in the network and enables to see if some actors have more influence on collective action;

- A structural approach aims at characterizing the network's structure and understanding how it frames collective action;
- A statistical approach (Exponential Random Graph Model – ERGM) aims at controlling the effects of endogenous and exogenous processes in shaping the advice network.

Concerning the qualitative analysis, I did an assessment of trust and conflicts among the actors involved in the producer association in the Brazilian case, and among the members and towards other actors involved in the LAS in the Italian case.

At last, I conducted an analysis of the territorial proximity, using both the qualitative and quantitative methods (e.g. distance measurement between actors, transport and communication infrastructures, participation to meetings or assemblies and participation to cultural life) (Pachoud et al., 2019).

The similarities in the data analysis allow drawing a comparison between both case studies in discussion.

2.2.3. Focus on the third specific objective

The third objective, smaller than the two first objectives in terms of data collected and analyzed, is “to link producers’ representations of identity and the feeling of belonging to territory to their degree of involvement in collective action”.

To respond to this objective, a single article has been published on the Brazilian case. For that, the extension agents of different municipalities were asked to define producers according to different involvement in collective action (from high to low). From the chosen producers, I use a combination of a quantitative and a qualitative method. First, the producers were asked to cite ten words related to their identity, through the free word association method. The collected words were analyzed by a Factorial Correspondence Analysis (FCA). Second, the qualitative analysis corresponds to closed questions to the producers to assess their feeling of belonging (Pachoud, 2019).

In the province of Trento, I conducted a qualitative analysis of the feeling of belonging with the members of the dairy cooperative studied for the second specific objective. The questions were related to:

- the level of proudness of their territory (from 0 (low) to 10 (high));
- the name of the place from where they feel coming from (to obtain the territoriality boundaries);

- if they consider living in this place for all their life.

The results have not been published because I think that the results are not rich enough to be published in an article on their own. In the Italian case study, the issue related to identity has not been addressed. However, the results concerning the feeling of belonging and their engagement in collective action are used for the comparison with the Brazilian case in the discussion.

2.2.4. Contribution of collective action to territorial development

In order to increase the understanding on how collective action in LAS can contribute to territorial development, I chose different indicators, related to the economic, social, cultural and environmental dimensions. The objective is to open some perspectives on the assessment of territorial development according to the degree of achievement of collective action in LAS. For that, I will compare both case studies in the discussion chapter. The indicators are presented in table 8.

Table 8. Indicators chosen to assess territorial development.

Dimension	Indicator
Economic	Evolution of the price of the cheese between 2008 and 2018
	Comparison of the price with similar cheese between 2008 and 2018
	Added-value distribution
Social	Settlement of farmers from 2008 to 2018
	Jobs induced by cheese production
Cultural	Positive effects
Environmental	Positive effects

Now that I have exposed the conceptual framework, in the next chapter I provide information on the two case studies.

Chapter 3. The case study areas



Figure 11. Serrano cheese in a traditional dairy in the Campos de Cima da Serra, Brazil (source: own photo, 2017).

Introduction

To respond to the research objectives, I conducted the study in two different areas. The first one is located in the Campos de Cima da Serra, in Southern Brazil and the second one in the province of Trento, in Northeastern Italy. This chapter presents the agricultural context as well as policies implemented for rural development in both countries. Then, it provides details on both case studies.

3.1. The Campos de Cima da Serra in southern Brazil

The first part of this section presents the Brazilian agricultural model and policies that have been implemented for rural development. It also provides details on livestock farming and cheese production. The second part presents the case study, located in the Campos de Cima da Serra.

3.1.1. Brazilian agricultural context

3.1.1.1. The duality of two agricultures

Brazil is the world's third largest agricultural exporter (FAOSTAT, 2014). This success is based on a dual agriculture between agribusiness and family farming. These two forms of agriculture, often source of land use conflicts, do not have the same market logic (Delgado and Bergamasco, 2017).

On one hand, agribusiness focuses on commodity crops, particularly on soybeans, intended for export (Coy et al., 2019). This agriculture model is based on the so-called “reprimarisation” of the economy. This phenomenon has been influenced by a phase of neoliberal opening in the 1990s, which has led to the commodity boom in the 2000s (Hafner et al., 2016). The three main export products are soybeans (46 % of the export value; first world exporter), meat (14 % of the export value; first beef exporter) and timber (13 % of the export value) (MAPA, 2019a). In Brazil, the Ministry of Agriculture, Livestock and Supply (MAPA) is responsible for the implementation of public policies for the agribusiness sector.

On the other hand, family farming production is mainly intended for the domestic market. Family farming plays a fundamental role in the national food and nutritional security (MDA, 2018). Indeed, it produces 70 % of the food consumed in Brazil, of which 87 % of manioc and 70 % of beans. For the livestock sector, it represents 60 % of milk production, 59 % of the pig herd and 50 % of poultry production. Although family farming generates 38 % of

the agricultural added value and uses 24 % of the arable area, it represents 84 % of the agricultural holding and employs 74 % of the agricultural work force (IBGE, 2009). From 1999 to 2016, the Ministry of Agrarian Development (MDA) used to represent family farmers. Following reforms of the new conservative government, the MDA was abolished in 2016 and a special secretary of family farming and cooperatives, managed by the MAPA, was created in 2019 (MAPA, 2019b).

3.1.1.2. Rural development in Brazil

Historically, rural development in Brazil was marked by a centralization of decision-making and a lack of articulation with local knowledge and experiences (Abramovay, 2003). From the 1960s, rural development was associated with the process of “agricultural modernization” through the substitution of technics considered outdated. Thereby, technical innovations developed by the research were diffused from agricultural extension agents to farmers. This process called “green revolution” or “conservative modernization” was led by actions of the government and international institutions (Coy and Neuburger, 2002; Schneider, 2010). “Conservative modernization” involved mainly large farms, which contributed to maintain the dualism of the agrarian system (i.e. agribusiness and family farming).

The constitution of 1988 provided new opportunities for civil society participation (Grisa and Schneider, 2014). In fact, since the 1990s, there has been a change of focus and understanding about rural development in Brazil. This change was strongly linked to the re-organization of social movements and organizations that have been repressed during the military dictatorship and have now returned to the political arena. It was also supported by the multiplication of research on family farming at this period. The emergence of the debate on family farming in Brazil resulted in the growing influence and action of the government and the formulation of public policies. First, the National Program for the Strengthening of Family Agriculture (PRONAF) was created in 1995 to support the agrarian reform settlements and promote family farming. The PRONAF also triggered the emergence of other rural development policies (i.e. food security policies, land regularization, support to indigenous people) (Coy and Neuburger, 2002; Schneider, 2010). Second, the MDA, created in 1999, stood as an alternative and an opposition to the agribusiness, represented in turn by the MAPA. In 2006, the Family Agriculture Act was implemented (Law nº 11.326), and officially recognized family farmers as a social category (Grisa and Schneider, 2014; Pachoud, 2020).

Nowadays we are witnessing a regression regarding the debate and recognition of family agriculture since 2016, including the abolition of the MDA and the reduction of the budget allocated to family agriculture. Policies are insufficient to promote rural development. Indeed, there are great challenges for local actors to be part of development projects (Pachoud, 2020). For that, Brazil would need institutions that integrate local knowledge, allow innovative initiatives and facilitate local learning processes (Abromovay, 2003). Nonetheless, the evolution of markets and modes of consumption, particularly through the growth of the middle class in the last two decades (WB, 2012), forced the family farmers to innovate in the way they produce and sell their products. They showed a high capacity to adopt new techniques and organization models. For example, there has been a great transition from conventional to organic farming with only 5.900 organic producers in 2012 compared to 17.700 in 2019 (MAPA, 2019c). New production rules in the context of certified production linked to the quality or to the origin of products were defined. Producers also developed new forms of marketing, such as direct marketing (Ambrosini and Filippi, 2008; Cerdan et al., 2010b; Neto et al., 2010; Santos and Menasche, 2015; Wilkinson et al., 2016). Several studies showed that these technical and organizational changes have a positive impact for small-scale producers and marginal rural areas (Cerdan et al., 2009; Cerdan and Vitrolle, 2008; Pereira et al., 2016; Souza et al., 2019).

3.1.1.3. Livestock farming and cheese production in Brazil

In Brazil, cattle are mainly reared extensively, with pastures as the main feeding source (Amaral et al., 2012). According to the IBGE (2007), at the beginning of the 2000s there were 172 million hectares of grassland (natural and artificial), corresponding to 20 % of the country's area (figure 12). In 2017, Brazil had more than 226 million cattle, being the second largest herd after India (IBGE, 2017).

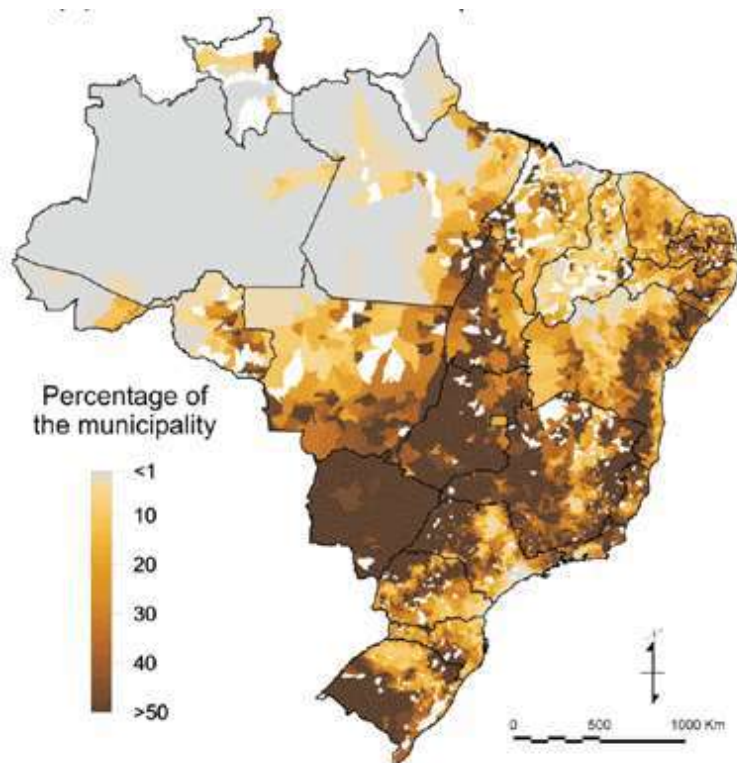


Figure 12. Area (in %) of permanent pastures in Brazil by municipality (source: Sparovek et al., 2007).

In 2017, Brazil produced 35.1 billion liters of milk (Embrapa, 2018) and family farming accounted for 60 % of the production (MDA, 2018). Brazil is the sixth largest producer of cheese in the world, although the average per capita consumption is still low, around 5 kg/year (ABIQ, 2019). Nonetheless, cheese consumption is expected to grow in the future due to increased purchasing power of the consumers. In 2017, 11 billion liters of milk were processed into cheese, and cheese production exceeded 1 million tons (+ 13 % compared to 2011). However, most of the cheese processed is industrial cheese, made from pasteurized milk. Almost 75 % are considered as “great commodities”, which are the *mozzarella*, the *queijo prato* and the *requeijão culinário* (Zoccal, 2016). In Brazil, there are sixteen artisanal cheeses, made from raw milk (Slow Food Brasil, 2013). However, the artisanal production has still an insignificant weight at the national level and is not included in national statistics as it is most of the time informal. Indeed, Brazilian consumers prefer young cheese over matured one; however the Brazilian legislation does not authorize marketing raw milk cheese with less than sixty days of maturation. In addition, the sanitary norms in Brazil for dairy products do not consider the specificities of artisanal production (see 3.1.2.3.).

Despite the informality of artisanal cheese production, the demand for these products is growing in Brazil. Indeed, consumers are increasingly concerned about the origin, quality and taste of the products. There is also a strong concern about the environmental and health impacts of industrial foods (Cruz, 2012). A common strategy used to valorize artisanal products on the market concerns geographical indications, of which PDO. Today, there are nine PDO products in Brazil. The wine Vale dos Vinhedos was the first product which obtained the PDO in 2012 (Wilkinson et al., 2016). However, there is still no PDO for cheese. There was only a request in 2017 for the Serrano cheese at the National Institute of Industrial Property (INPI), the respective authority for the geographical indications in Brazil (Vitrolle, 2011). It is this case study that I investigate through my research.

3.1.2. The Serrano cheese in the Campos de Cima da Serra

3.1.2.1. Presentation of the Campos de Cima da Serra

The Campos de Cima da Serra is a mountain area, as defined by the GMBA, with 77 % of its surface located between 700 and 1,100 m of altitude. The highest peak reaches 1,822 m. The region is located at the transition between the Atlantic Forest and the Pampas biome. The climate is temperate, with average temperatures between 8°C in winter, with some frost and snowfalls, and 19°C in summer. Average precipitation is 1,500 to 2,000 mm, spread across the year. The ecosystem corresponds to plateaus of natural pastures, where the species *Andropogon lateralis* and *Schizachirium tenerum* dominate, and isolated stands of araucaria forests (*Araucaria angustifolia*). The soils are shallow, with rocky outcrops. Fertility is low and comes from the decomposition of volcanic rock. The relief is wavy and the eastern side of the region is characterized by the presence of canyons (Pachoud and Schermer, 2019).

This region covers 35,000 km² and is located in two different states: Santa Catarina, which gathers eighteen municipalities and Rio Grande do Sul, which regroups sixteen municipalities (figure 13) (Vieira and Dortzbach 2017).

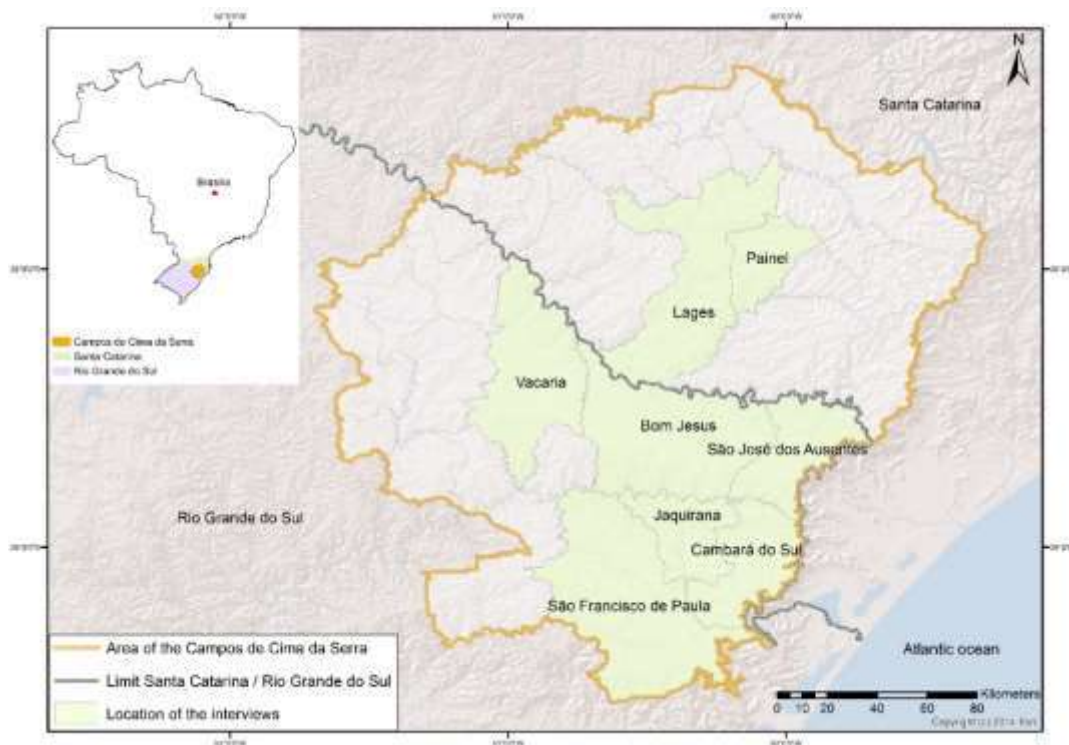


Figure 13. Geographical area of the Campos de Cima da Serra (source: own elaboration).

The region is isolated, with low infrastructure development (i.e. transport axis, information and communications technology) and a low population density (IBGE, 2018a). Table 9 presents some demographic and economic data of the Campos de Cima da Serra in 2018.

Table 9. Demographic and economic data of the Campos de Cima da Serra.

Variables	Campos de Cima da Serra
Population number	880,400
Rural population (%)	11.6
Population density (inhabitant/km ²)	19.5
Area of pastures (of which natural pastures) (in % of the UAL)	40.8 (32.3)
Area of annual and perennial crops (mostly pines, apple, maize, soya) (in % of the UAL)	29.7
Number of bovine heads	1,335,728
Agricultural gross added value (GAV) (% of the GAV)	11.8
Industrial GAV (% of the GAV)	26.1
Tertiary sector GAV (% of the GAV) (mostly public services)	62.1

(source: IBGE, 2018a)

3.1.2.2. Production characteristics

The Serrano cheese is a traditional raw milk cheese, produced as a by-product of beef cattle farming in the Campos de Cima da Serra. More than 90 % of the farms correspond to small-scale units. It is estimated that more than two thousand families produce Serrano cheese (one thousand families in each state) and for whom cheese making is the principal economic activity on the farm (i.e. more than 50 % of the revenue) (Ries et al. 2014; Vieira and Dortzbach 2017). The most common production system is an extensive mixed dairy-beef livestock system, with dairy and beef cattle simultaneously on the same farm. The breeds are mainly European breeds, such as Hereford, Devon, Charolais, Jersey and Holstein. Some breeds are local, like Girolanda or Franqueiro (Pachoud and Schermer, 2019).

There are only a few lactating cows per herd intended for cheese production. The others are left to provide milk for the calves. They are milked once a day and the women generally take over the processing of milk into cheese. The herds graze on natural pastures all year round, supplemented by temporary grazing on improved artificial pastures (oat and rye-grass). In winter, to handle the shortage of natural forage, the producers distribute a supplement of soya or maize silage to the lactating cows (Pachoud and Schermer, 2019). Ambrosini (2007) identified six different production systems, all as family farming systems. Five systems are considered traditional breeding systems (mixed milk beef systems). The decisive factors are the presence or absence of breeding and/or fattening calves or the presence or absence of commercial crops on the property. Only one system was characterized as intensive dairy system exhibiting a separation between milk and beef breeds, no fattening of the calves, and milking cows twice a day. However, this intensive system represents only 3 % of the farms producing Serrano cheese. The six farming systems are:

- 1) Raising calves with feed produced on the farm (corn, soya and artificial pastures);
- 2) Raising, reproduction and fattening of cattle with feed produced on the farm;
- 3) Raising calves with feed produced on the farm for their own herd and for commercialization (e.g. corn, soya, bean);
- 4) Raising and reproduction of cattle with feed produced on the farm for their own herd and for commercialization;
- 5) Raising, reproduction and fattening of cattle with feed produced on the farm for their own herd and for commercialization;
- 6) Dairy system without raising of calves.

Table 10 presents the size and production per farm of a sample of sixty-seven families producing Serrano cheese in the Campos de Cima da Serra (Pachoud and Schermer, 2019).

Table 10. Average production and size of the farms producing Serrano cheese.

Variables	Average	Minimum	Maximum
Number of cattle	90.6	14.0	800.0
Number of cows milked	14.4	3.0	40.0
Milk production (L milk/cow/day)	8.0	2.0	20.0
Cheese production (kg cheese/day)	10.5	2.0	70.0
Total area (ha)	132.2	6.5	980.0
Area of natural pastures (ha)	96.7	3.0	90.0
Area of improved pastures (ha)	17.5	2.0	70.0

Cheese producers usually conduct other food production (e.g. ovine, wine, sausages). Annual and perennial crops (e.g. soya, corn, potatoes) are cultivated mostly by entrepreneurs who live outside the region (IBGE, 2018b). Cultivation of soya and maize has begun in the 1970s in the region. Usually, the entrepreneurs buy the land to the producers. Crops are advancing progressively from the East of the Campos de Cima da Serra, substituting natural pastures (Pachoud, 2020). In 2017, there were 2,500 km² of soya crops (IBGE, 2017), whereas potato and vegetable (e.g. broccoli) are grown in summer, and artificial pastures are located in winter. Lands belong to the cheese producers and are rented to the entrepreneurs in summer.

3.1.2.3. Legislations and regulation systems

The Brazilian legislation does not authorize marketing raw milk cheese with less than sixty days of maturation since law n°1.283 came into force in 1952 through regulation n°30.691 (Presidency of the Republic of Brazil, 1950; 1952). Most of Serrano cheese producers do not respect this restriction because consumers prefer young cheese over mature, and hence they sell their products within less than thirty days, which makes the sales illegal (Cruz, 2012). Moreover, the sanitary norms in Brazil for dairy products do not consider the specificities of artisanal production which is subjected to the same sanitary standards and facilities as big dairy industries. Thus, it is impossible for small-scale farmers to comply with current legal standards because of the high costs of adaptation to food safety rules. Further, producers claim that the high standards have a negative impact on artisanal characteristics of the cheese, for example, as they are required to replace wooden molds with plastic ones. Besides the illegality of sale,

production of this cheese offers the potential for greater health risks for the consumer, as there is no sanitary control (Cruz, 2012; Pachoud and Schermer, 2019).

In Brazil, regulation systems exist on different scales: at the municipal, state and federal level. The three levels have their own control bodies. The municipal inspection service (SIM) establishes and controls the sanitary norms for production and the sale of Serrano cheese that was ripened for more than sixty days (mature cheese). This is a precondition for selling the cheese, but only within the area of the municipality. The inspection veterinarians employed by the prefectures of the municipalities control the health of the herd and the adequacy of the infrastructures (Pachoud, 2020; Pachoud and Schermer, 2019).

At the state level in Santa Catarina state, the law for authorizing Serrano cheese sales has been signed in September 2016 (Law n° 17.003/2016) and the decree (Decree n°1.238/2017) by the state secretary of agriculture in July 2017 (State of Santa Catarina 2016, 2017). In the state of Rio Grande do Sul, the law n° 14.973, which legalizes the commercialization of Serrano cheese, was approved in December 2016. The decree n° 54.199 was approved in August 2018 (Pachoud, 2020; State of Rio Grande do Sul 2016, 2018).

However, few producers are certified: still less than twenty families have the SIM certification today. Most of the milk processing facilities are very far from the norms required. The lack of prospects for passing the farm on to the next generation makes producers reluctant to invest in new dairies (Sgarbi, 2014). In this context of informality, the majority of the Serrano Cheese is sold locally in the region or in nearby cities (e.g. Porto Alegre, Caxias do Sul, Criciúma), by direct sales to consumers or in small markets of the region (Cruz, 2012). There are also new marketing strategies including a cheese trader from São Paulo who comes to get cheese from a producer to resell the cheese in São Paulo, at a higher price, and some people ordering cheeses by post (Pachoud and Schermer, 2019; Sgarbi, 2014). In addition, growing tourism in the region offers the potential of a new market opportunity for the producers.

3.1.2.4. The extension services

The EPAGRI-SC is the public Company of Agricultural Research and Rural Extension of Santa Catarina and was created in 1991. However, extension services already exist in the state since 1956. There are two regional offices located in Lages and São Joaquim. Every municipality has its own office. At the regional scale, one extension agent coordinates a group

of eighteen extension agents (one in each municipality) working especially on the Serrano cheese production (Pachoud, 2020).

The EPAGRI-SC signed the first agreement with the MAPA in 2008 in order to implement projects with the objective of promoting the historical recovery of the Serrano cheese. The agreement also aimed at registering and training producers, analyzing the physical, chemical and microbiological characteristics of the cheese as well as describing production and manufacturing processes. This agreement led to the achievement of the first State Secretariat for Agriculture, Livestock, Fisheries and Food Supply (SEAPPA) regulation (n°214/2010), which established the possibility of producing Serrano cheese, defined the characteristics and delimited the producing region. In 2013, a second agreement was signed, which aimed at organizing the production and obtaining the Campos de Cima da Serra PDO. In August 2017, the certification was requested to the INPI, but has not been issued yet.

The EMATER-RS is the Company of Technical Assistance and Rural Extension in the Rio Grande do Sul state, which was created in 1955. This institution is private and has no agreements with the MAPA to implement joint projects with the EPAGRI-SC. There is one regional office in Caxias do Sul and one state office in Porto Alegre. All municipalities have their own office with one or several extension agents working directly with the producers. At the EMATER-RS, there is no group dedicated to the Serrano cheese production; the extension agents have to deal with all activities led by the services and all kinds of production.

3.2. The province of Trento in the Italian Alps

This section presents the agricultural model in Italy and the policies that have been implemented for rural development. Then, it provides information on livestock farming and cheese production. At last, it exposes the case study, located in the province of Trento.

3.2.1. Italian agricultural context

3.2.1.1. A model based on family farming

Family farming is predominant in Italy. The family workforce represents 79 % of the total workforce (ISTAT, 2013). However, Italy is not self-sufficient in the agrifood sector. In 2011, food production covered only 82 % of the national needs. The agrifood trade balance decreased since 1970, with the main reasons being land abandonment, urbanization, in addition to population growth (ISTAT, 2012). Moreover, the sector has to face with the ageing of the agricultural workforce and a lack of succession (62 % are over 55). There is therefore a significant decrease in the number of farms (-32 % compared to 2000) and a decrease of the total Utilized Agricultural Area (UAA) (-3 % compared to 2000 and -18 % since 1990), despite the increase in the size of the farms (ISTAT, 2013).

The main agricultural activities in Italy are cereal production (including maize) (31 % of UAA), forage crops (14 % of UAA), olive tree (8 % of UAA), vineyards (6 % of UAA) and orchards (e.g. orange, apples, and pears) (4 % of UAA). Horticulture is also a major contributor to agricultural Gross Domestic Product (GDP), including tomatoes and potatoes (INEA, 2012).

3.2.1.2. Rural development in Italy

In Italy, the European Agricultural Fund for Rural Development (EAFRD) funds projects of rural development through the LEADER program. LEADER stands for “Links between actions for the development of the rural economy” from the French title “Liaison entre actions de développement de l’économie rurale”. This program is intended for marginal rural areas in the EU since 1989 and is today mainstreamed into the EU rural development policy (European Commission, 2019a).

The operational principles of LEADER are (1) bottom-up planning and implementation of projects; (2) the integration of innovative and multi-sectoral solutions to rural problems; (3) a shift to a more place-based approach; (4) the promotion of local partnerships proposed by public and non-public sectors; and (5) networking and cooperation between different actors

(Pisani et al., 2017). Thus, the LEADER approach differs from conventional development approaches as it promotes a development that emerges from the local actors themselves. It relies on Local Action Groups (LAGs) responsible for defining a local development strategy, according to the local needs. LAGs correspond to the local planning and management units, composed by public and private rural partners, who operate through multi-level and multi-sectorial interactions. More precisely, they are responsible for programming, budgeting and monitoring the operations of the projects. Some evidence from LEADER evaluation reports confirms that the program can play a crucial role in encouraging sustainable development processes and in fostering territorial innovations. However, general conclusions are still difficult to draw, as successes and failures have been evidenced (e.g. Dax et al., 2016; Dax and Oedl-Wieser, 2016; Granberg and Andersson, 2016; Mathé et al., 2014; Navarro et al., 2015; Pisani et al., 2017).

3.2.1.3. Livestock farming and cheese production in Italy

Regarding the livestock sector, there were almost 6 million cattle in 2017, including 1.8 million dairy cows that produced 11.9 million tons of milk. The others ruminant farming production are also significant, with 7.2 million ovine heads, 1 million goat heads and 0.4 million buffalos (ISTAT, 2017). In Italy, there is a strong contrast between intensive livestock farming located in the plains, mainly for fattening, and extensive livestock farming in mountain regions, mainly for cheese production (i.e. Alps, Apennines and Sardinia). The pastures surface represents 27 % of the UAA and is mainly located in mountain areas (figure 14) (ISTAT, 2013).



Figure 14. Area (in %) of permanent pastures in Italy by municipality (source: ISTAT, 2013).

Italy is the European country with the largest number of food products with geographical indications, including PDO. In 2019, there were 299 food products and 524 wine types, which had been registered with a geographical indication (MIPAAF, 2019). In addition, agritourism is booming in Italy. In 2017, there were 23,406 farms with agritourism activities, with an increase of 3.3 % compared to 2016 (ISTAT, 2017).

The total cheese production in 2017 was 1.3 million tons (+ 2.3 % compared to 2016) (ISTAT, 2017). According to Clal (2018a), there are 487 types of Italian cheese. The annual cheese consumption is 23 kg/capita. Italy is the first country in terms of number of geographical indications conferred by the EU, and out of the 299 food products with a geographical indication in 2019, 52 were cheese (of which 48 PDO). About half of the milk delivered by Italian farms is intended to PDO cheese processing. The PDO cheese production reached 460,000 T in 2018 (+ 1 % compared to 2017) (Clal, 2018b).

3.2.1.4. Legislations for cheese production

The effort to preserve raw milk cheese in Europe began in the 1990s after strong industrialization and standardization processes of food products. Two points of view emerged within the European Union: The northern countries wanted to forbid raw milk cheese for sanitary reasons while the middle and southern countries wanted to preserve raw milk cheese, because it is a benchmark of their culture heritage. Researchers, especially from France, conducted studies on the properties of raw milk cheese and the economic impact from changes in quality due to pasteurization. Results showed that pasteurization would have significant changes in cheese characteristics (e.g. flavor) and would negatively affect economies of concerned countries (Dixon, 2000).

Thus European countries, through mutual agreement have developed two directives for the regulation of dairy products. The first one which came into force in 1993 through the council directive 92/46/EEC, refers to "the health rules for the production and placing on the market of raw milk, heat-treated milk and milk-based products intended for human consumption". The second one which came into force in 1993 through the council directive 93/43/EEC, concerns "the hygiene of food stuffs" and refers to the use of HACCP protocols, based on the *Codex Alimentarius*. These two directives allowed the production of raw-milk cheeses as long as certain minimum requirements are met (i.e. sanitary norms, infrastructures and labelling). Each European Union member state should follow these minimum regulations, but they can also establish stricter measures, up to banning the sales (European Commission, 2019b). In Italy, raw milk cheese production is allowed for young and matured cheeses, as long as the farm is registered to the authorities and the production is labelled with "made with raw milk". In addition, the infrastructures, the health of the herd and the microbiological and somatic counts should respect the European norms.

3.2.2. Cheese production in the province of Trento

3.2.2.1. Presentation of the province of Trento

The Autonomous Province of Trento is located in the Alps of northeastern Italy. It covers an area of 6,200 km² and is divided to 217 municipalities (figure 15) (ISTAT, 2010). The province is located in the mountains according to the GMBA definition. 70 % of the province area is over 1,000 m and 20 % over 2,000 m of attitude. The highest peak reaches 3,769 m. The total population is of 530,000 inhabitants with a density of 85.5 inhabitants/km².

However, the most part of the population lives at the valley bottom whereas the mountain parts are little populated. UAA covers 1,372 km² and is predominantly characterized by meadows and pastures (81 %), followed by orchards and vineyards (17 %) and arable crops (2 %) (ISTAT, 2010). Meadows for hay production are located mainly in the valleys, whereas pastures for summer livestock grazing are usually located above 1,500 m of altitude.

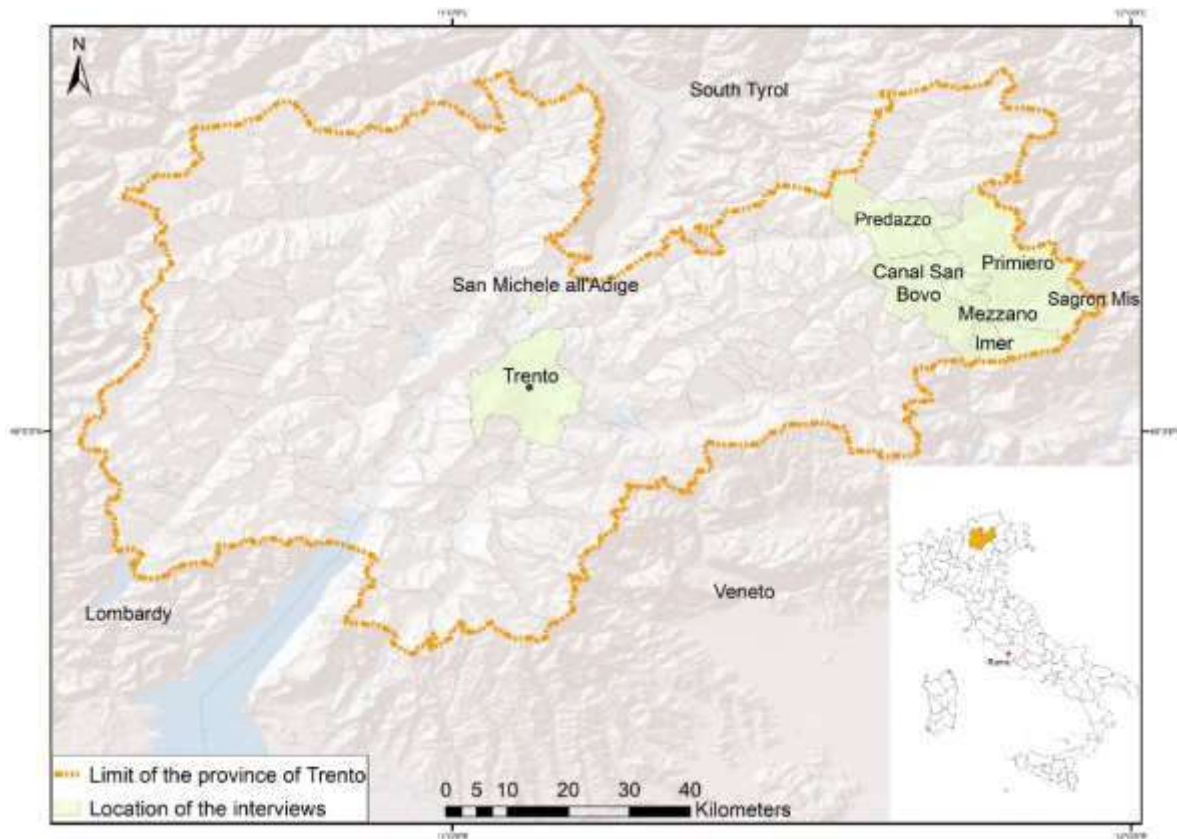


Figure 15. Localization of the province of Trento (source: own elaboration).

3.2.2.2. Production characteristics

Dairy cattle are the main component of the livestock sector in the Province: in 2018, out of 1,400 farms, 800 were dairy farms. The size of the herd was composed of 45,500 bovines, of which 24,500 were lactating cows. The breeds present in the Province are divided as follows: 39 % of Holstein, 30 % of Alpine Brown and 20 % of Simmental for the cosmopolitan breeds. Rendena and Alpine Grey of the local breeds represent consecutively 6 % and 5 % (FBPT, 2018).

Sturaro and al. (2013) distinguished four production systems in the dairy sector in the province of Trento:

- 1) The first group is called “original traditional” and represents 50 % of the dairy farms. The producers in this group use tie-stall, local breeds, move the lactating cows to summer pastures and use mainly hay and concentrate during winter.
- 2) The second group is also traditional. However, the producers do not move the lactating cows to summer pastures. They represent 25 % of the dairy farms.
- 3) The third group is traditional using silage, which is not authorized for PDO cheese making. It represents 6 % of the dairy farms. Half of them move the cows to summer pastures.
- 4) The intensive group represents 19 % of the dairy farms. The producers use free stall, milking parlor and cosmopolitan breeds. Animal feed, rich in concentrates, is imported from other areas. Two thirds of farmers in this group use silage and many have adopted modern feeding techniques (i.e. unifeed). Most of the producers do not move the cows to summer pastures.

Dairy cattle breeding has always been an important agricultural activity in the province where the morphology of the territory and the climate did not allow many other forms of agriculture. The land ownership was affected by the particular mountain morphology which is characterized by the dualistic presence of small fragmented properties and collective pastures and forests. While small fragmented properties, due to the heritage system, are located in the valleys and low mountain areas, and are intended for cultivation (i.e. orchards and vineyards mainly), pastures and forests managed collectively by the families are found on higher altitudes (Bond, 2001).

Today, there is an abandon of mountain pastures and of the steepest mountain areas. Between 1990 and 2010, there was a 7 % reduction in meadows and pastures (ISTAT, 2010). Simultaneously, between 2000 and 2018, dairy farms decreased from 1,800 to 800 and the average herd size increased from 13.2 to 30.6 cows per farm (FBPT, 2018; ISTAT, 2018a). Intensification took place in the valleys, which are more disposed to mechanization, and where meadows are used in a very intensive manner (several cuts per season) or transformed into annual or permanent cropland. There has been an expansion of intensive permanent crops, mainly vineyards and orchards. Vineyards, for example, have increased by 15 % between 1990 and 2010, spreading up from the bottom to the sides of the valleys (ISTAT, 2010).

Traditionally, during summer, cows are moved to summer pastures, which represent a surface of about 420 km² (about 7 % of the entire provincial area) (FBTP, 2018). Summer

farms are mostly publicly owned by the municipalities and each of them usually accommodates animals from more than one permanent farm. Nonetheless, many farms have abandoned the practice of moving lactating cows to summer pastures (Sturaro et al., 2013). Today, there are 305 summer farms and only half of them are intended for lactating cows and host about 11,500 cows (47 % of the total). The other half of the summer farms graze with late lactating cows or heifers (FBTP, 2018; Pachoud et al., 2020).

3.2.2.3. Organization of cheese production

Dairy farming is strongly connected to dairy cooperatives, which produce typical cheese. More than 80 % of the total milk (120,000 tons a year) produced in the province is processed by seventeen cooperatives, gathering 729 milk producers. The cooperatives are associated with the Concast-Trentinagrana, the Consortium of Dairy Cooperatives of the Province of Trento created in 1973. The consortium ripens and sell the cheese under the branch *gruppo formaggi del trentino*. Moreover, it takes over the analyses of the milk and cheese; gives technical assistance to cheese production and produces and sells butter (1,600 T/year) and milk powder (76,000 T/year) (Concast, 2019). The remaining part of the production is done by around seventy producers who confer the milk to mainly one private dairy located in the Southeast of the province. This dairy processes the milk into traditional cheese. The producers have usually a more intensive production system, as they represent 9 % of the total number of the producers and produce around 20 % of the milk of the province.

The main cheese produced in the province is the Trentingrana (40,400 T/year in 2018), by sixteen of the seventeen cooperatives. Approximately 50 % of the total milk produced in the province is transformed into Trentingrana (Merz, 2011). The production of Trentingrana follows certain specifications: for example, cows used for the production of this cheese cannot be fed with silages (Bittante et al., 2011). Trentingrana represents 1.5 % of the national cheese production; and 30 % of this production is sold locally in the region, 65 % in the others parts of Italy and the remaining 5 % are exported to international markets, mainly in Germany (Concast, 2019). The remaining part of milk production is intended for drinking milk, yogurt and to produce other traditional cheeses including the Puzzone di Moena, Vezzena del Trentino, Casolet Val di Sole, Fontal di Cavalese, Tosela di Primiero, Mezzano Trentino, Sprezza delle Giudicarie and Affogato di Sabbionara. 70 % of the traditional cheese is sold locally, 29 % is sold in other parts of Italy and 1 % is exported abroad. All the cheese, except the Casolet, Fontal and Tosela, are made from raw milk. Moreover, the Trentingrana (since

1987), Puzzone di Moena (since 2014) and Sprezza delle Giudicarie (since 2002) are PDO certified.

The milk produced on summer pastures represents around 6 % of the annual production and corresponds to around 9.000 T/year in 2018. The processing of milk on highland pastures is conducted in about ninety summer farms; it represents 2,000 tons of milk, and the main part is transported to the cooperatives in the valley for processing. The cheese deriving from milk produced on summer farms are marketed by the consortium under the brand *Sapori di Malga*. Concerning the Trentingrana, the number of cheese types marketed by the Consortium are about 500 per year out of the approximately 101,000 sold annually, representing less than 0.5 %. In the case of the other traditional cheeses, it represents about 4 % of total production.

3.2.2.4. Technical assistance to the dairy sector

The Federation of Breeders of the Province of Trento (FBPT), the Edmund Mach Foundation (EMF) and the veterinary services are important actors involved in the production. The FBPT, founded in 1957, is a cooperative, which associates around 800 breeders (i.e. almost all the breeders of the province). The federation encompasses two main activities: a technical activity for the genetic improvement of the milk breeds, which includes milk control and semen for artificial insemination; and a commercial activity for the beef from male calves and cull cows. The EMF founded in 1874 is a public entity that has a central role in advising and training the producers, and in research in the agricultural and agri-food fields. The veterinary service works both as a health assistance body for the farms and as a supervisory body for compliance with health and hygiene regulations for milk and cheese production. In addition, the Cooperation Federation of the Trento Province (CFTP) plays an important role of representation, assistance, protection and review of the balance sheets of the cooperatives of the province.

Conclusion

Both case studies present major differences, for example with regard to the legal framework or the production organization. Nonetheless, they also show important similitudes, regarding for example the growing interest from the consumers, the use of geographical indications, the prevalence of family farming, the intensification issues or the land use change. This will allow to draw a comparison in discussion. In the chapter that follows, I present the abstracts from the six articles.

Chapter 4. Papers: abstract



Figure 16. Transhumance celebration in late summer in Tyrol, Austria (source: own photo, 2018).

4.1. Paper 1

Pachoud, C., Schermer, M., 2019. Reconciling Tradition and Innovation in Traditional Mountain Cheese Value Chains: The Role of Social Capital. The Case of the Artisanal Serrano Cheese Value Chain in Southern Brazil. In: E. Landsteiner and T. Soens (Eds.), *Farming the City. The Resilience and Decline of Urban Agriculture in European History*. Innsbruck/Wien/Bozen: Rural History Yearbook 16, pp. 189-217.

Abstract

Globalised and production-oriented agriculture often leads to the exclusion of rural mountain areas and to the marginalisation of their traditional food value chains, of which cheese is particularly interesting. Important elements for such value chains are the valorisation of the product quality and of traditional know-how. Territorial innovations, defined as a response to a problem identified collectively in a territory, allow adaptation to changes. Reconciling tradition with territorial innovation is central for the resilience of the value chain and social capital is the resource that needs to be mobilised to cooperate and innovate. In this contribution, we analyse the history of the artisanal Serrano cheese in southern Brazil. The aim of this article is to analyse strategies for building a resilient artisanal Serrano cheese value chain by studying the role of social capital in the balance between maintaining traditions and the emergence of territorial innovations. In the results, first, we observe that the peasant families are central actors in maintaining tradition by passing on know-how to the next generations through bonding social capital. Second, the agricultural advisory services (EMATER-RS and EPAGRI-SC) are the central actors in the innovation processes by diffusing technical innovations, but also for the emergence of organizational innovations through the creation of producers' associations. The associations allow connecting the different actors of the value chain through linking and bridging social capital, necessary for territorial innovation to emerge.

Keywords: tradition; territorial innovation; social capital; mountain cheese value chains.

4.2. Paper 2

Pachoud, C., 2020. The quality of territorial governance: an assessment of institutional arrangements. The case of the Serrano cheese production in the Campos de Cima da Serra, Southern Brazil. *Die Erde* 151(1): 23-36. <https://doi.org/10.12854/erde-2020-424>

Abstract

Territorial governance is of growing interest in an endogenous development perspective, in which organizational and institutional arrangements are supplied by the actors themselves to ensure coordination. This study was carried out in the Campos de Cima da Serra in southern Brazil, where the Serrano cheese is produced. It is an informal production. In fact, new consumers' preferences for young instead of matured cheese, and national hygiene standards that are incompatible with small-scale and artisanal production make the legalization of the sales impossible for the producers. The aim of the study is twofold. First, it brings forward the territorial and value chain governance approaches from French and German-speaking literatures. Second, based on the analysis of institutional arrangements, it assesses the quality of territorial governance processes. For that end, the institutional arrangements implemented in the states of Santa Catarina and Rio Grande do Sul, in the Campos de Cima da Serra, were analyzed. Results show that two different strategies are adopted: In Santa Catarina, there is a strong coordination between all municipalities, whereas in Rio Grande do Sul, municipalities are acting independently, leading to less effective governance. However, institutional arrangements in both states are facing a lack of dynamism. They suffer especially from little mobilization of producers and little involvement of local authorities. The extension services are the central actors of the collective action, following a top-down model. Thus, the achievement of collective action would require more participatory governance through the integration of the different actors in the process, as well as support from the larger institutional environment.

Keywords: territorial governance; institutional arrangement; mountain cheese; Brazil.

4.3. Paper 3

Pachoud, C., 2020. Collective action for cheese valorisation in the province of Trento/Italian Alps: an institutional approach. *Journal of Alpine research* (under review, second revision).

Abstract

Collective action for quality differentiation of food products linked to a territory is a long-term process. It often faces problems because of a lack of understanding of multilevel dynamics. This article aims at going deeper into institutional complementarity for achieving collective action for the production and valorisation of differentiated mountain cheeses in the province of Trento, in the Italian Alps. Based on the Ostrom's institutional approach, we conducted an historical analysis of the multilevel institutions (formal and informal). Results showed that there was a subsistence economy between 1800 and 1950, which led to little commitment from the producers to build up collective organisations. While incentives were given by the government and the church to improve production and create cooperatives. From 1950, "modernisation" of agriculture increased dramatically productivity and allowed production to be intended for the market. This enabled the development of nested cooperatives managed directly by the producers. Local dynamics got support from the province, to which autonomy was granted in 1948. From this period, we observe an increasing level of trust among the different local actors and toward the provincial government. From 2000, valorisation of cheese specificity became a central strategy on different levels to face competition, through the creation of labels and the development of agritourism. However, at the same time there has been an intensification of the production. This leads to a loss of the link between products and territory. The future challenges are then, for the producers, to implement innovative institutional arrangements that allow a sustainable differentiation of their products.

Keywords: Collective Action; Institution; Specific Product; Mountain cheese; Province of Trento.

4.4. Paper 4

Pachoud, C., Labeyrie, V., Polge, E., 2019. Collective action in Localized Agrifood Systems: An analysis by the social networks and the proximities. Study of a Serrano cheese producers' association in the Campos de Cima da Serra/Brazil. *Journal of Rural Studies* 72: 58-74. <https://doi.org/10.1016/j.jrurstud.2019.10.003>

Abstract

Collective action within territorial organizations is complex. Initiatives often collapse from a lack of understanding of relational dynamics and logics of action. This article proposes a relational approach to study the collective action process within a producers' association of a Localized Agrifood System (LAS). We conducted the research within the APROCAMPOS association, located in the Serrano cheese LAS, which involves producer families, extension agents, inspection veterinarians and secretaries of agriculture. We first conducted a social network analysis of advice seeking within the association, through sociometric interviews with the producer members. Second, an analysis of territorial proximity, conducted through semi-structured interviews with the association participants, was combined with the social network analysis. Results showed that extension agents are in a very central position in the advice network. They follow a classical top down model of knowledge diffusion. The president of the association plays a key brokerage role, essential for the network cohesion and information flow. Second, the analyses revealed a lack of trust and reciprocity among producers, leading to a low level of interaction and collective action, which can, however, be improved by the combination of geographical and organized proximities. In sum, the top-down model leads to low levels of initiative and participation among the producers in collective action. Local knowledge needs to be integrated in a more participatory governance frame to build common projects of cheese valorization. Nonetheless, institutional arrangements appear instrumental to define political orientation that favors cooperation and meets the quality of the Serrano cheese and promotes the development of the territory as a whole.

Keywords: collective action; localized agrifood system; social network; proximity; mountain cheese; Brazil.

4.5. Paper 5

Pachoud, C., Delay, E., Da Re, R., Ramanzin, M., Sturaro, E., 2020. A Relational Approach to Studying Collective Action in Dairy Cooperatives Producing Mountain Cheeses in the Alps: The Case of the Primiero Cooperative in the Eastern Italian Alps. *Sustainability* 12(11): 4596. <https://doi.org/10.3390/su12114596>

Abstract

Compared with more productive areas, mountain areas are at risk of being marginalized, particularly in the agri-food sector. To circumvent price competition, local actors in the mountains can develop specialized local products, which depends on their capacity to act collectively. Collective action, however, is complex and needs to be better understood if it is to steer initiatives towards success. This article sets out a relational approach to studying collective action in a dairy cooperative located in a mountain area: The Primiero cooperative in the Italian Alps. The common pool resources and territorial proximity frameworks were combined in a social network analysis of advice interactions among producer members, and an analysis of trust and conflict among members and between members and other actors involved in the value chain. The results show that the success of collective action can be explained by various complementary factors. Firstly, members had dense relationships, with high levels of trust and reciprocity, while the president had the role of prestige-based leader. Nonetheless, the analysis also highlighted conflicts related to the production levels of “traditional” and “intensive” producers, although members demonstrated a high capacity to resolve conflicts by creating their own rules to control further intensification. Socio-economic status did not appear to play a role in advice relationships, showing that the members interact horizontally. However, the results show that the geographical isolation of some members tended to inhibit their commitment to the collective dynamics. At a higher level, trust toward other actors involved in the value chain plays a central role in carrying out joint projects to develop and promote cheese.

Keywords: collective action; cooperative; trust; social network; mountain cheese; province of Trento.

4.6. Paper 6

Pachoud, C., 2019. Identity, feeling of belonging and collective action in localized agrifood systems. Example of the Serrano cheese in the Campos de Cima da Serra, Brazil. *Cahiers Agricultures* 28(28). <https://doi.org/10.1051/cagri/2019028>

Abstract

The study is aimed at linking social representations of identity and feeling of belonging to territory of farmers, to their degree of involvement in collective action within localized agrifood systems (LAS). The study was conducted with producers' families producing Serrano cheese, in the mountains of the Campos de Cima da Serra, in southern Brazil. Collective action for the valorization of the Serrano cheese relied on the producers' associations, which are the only form of collective organization. Fifty-four families were selected according to their level of involvement in collective action. First, we used a quantitative approach called the free word association, analyzed by Factorial Correspondence Analysis. Second, we asked closed questions to the producers to assess their feeling of belonging. We showed that the content of the social representation reflected the participation of producers in collective action. Producers who put forward the typicality of the cheese, the territory and their identity, were the most engaged in the associations. On the other hand, producers not involved in associations put forward the difficulties of their activity. In this sense, it appears valuable to encourage discussion between the different producers according to their level of involvement to build common representations that favor collective action for the defense and valorization of the Serrano cheese. Nonetheless, most producers tended to show a high feeling of belonging which could form the basis for discussion. However, collective action in the LAS follows a top-down modelled by extension services, in which the producers need to be integrated in a more participatory governance to lead more efficient projects.

Keywords: identity; feeling of belonging; collective action; localized agrifood systems; mountain cheese.

Chapter 5. Discussion: a comparative approach



Figure 17. Milking demonstration to tourists in Alpine pastures in the Beaufortain massif, French Alps (source: own photo, 2015).

Introduction

In this thesis I put the empirical focus on mountain cheese LAS and collective action for territorial quality differentiation of cheese. More specifically, I was first interested in territorial governance structures, including the role of governments, and collective strategies for cheese differentiation. Then, I focused more on relational structures within a collective organization, highlighting the role of norms and territorial proximity in collective action. Finally, I put more emphasis on the identity and feeling of belonging for collective action achievement. Therefore, I mobilized three frameworks: the CPR framework that emphasizes the role of norms and institutional arrangements, including higher institutional levels; the territorial proximity framework that highlights the role of geographical and organized proximity; and the territoriality framework that focuses on the feeling of belonging and identity. Two case studies were chosen for the study. The first one located in the Campos de Cima da Serra (CCS) in Brazil and the second one in the province of Trento, in Italy. Both cases are diverse concerning the organizational structure of the production. While the production system in the province of Trento is structured mainly in dairy cooperatives, the production in the CCS is organized individually on the farm. In addition, the production in the CCS is still mostly informal due to consumers' preferences for young cheese over mature one, of which commercialization is prohibited, and adequate legal frameworks for artisanal cheese production is missing. However, the objective of the comparative approach is not to judge the organizational structure of the production but to define determinants of success or failure of collective action for territorial quality differentiation, independently from the organizational form of the production. The empirical analysis allowed improving the knowledge in terms of territorial governance and relational patterns among actors, as well as on the collective strategies of differentiation and the role of identity in differentiation process of cheese in mountain areas. This has led me to define the following questions:

- 1) How do the different territorial governance structures affect collective action? What is the role of governments? Does a pertinent territory scale have to match administrative boundaries?
- 2) What collective strategies can be implemented for territorial quality differentiation of mountain cheese? What are the conditions for success?
- 3) Which are the determinants of the relational structures among producers to enable successful collective action? What is the role of the geographical and organized proximities?

4) What role do collective identity, feeling of belonging, and collective action play in territory construction?

5) What is the role of mountain cheese LAS for the development of mountain areas? Can we formulate relevant indicators of territorial development?

I answer these questions through a comparative approach detailed in the section that follows. To deepen the understanding, I complement the discussion by adding some other case studies that I have had the opportunity to explore during previous experiences (i.e. professional experiences, scientific workshops and internships). This allows confirming or rejecting the specific hypotheses formulated in the introduction.

5.1. Two contrasting forms of territorial governance

The comparative approach between the two case studies allows highlighting different structures of territorial governance and collective dynamics, presented in table 11.

Table 11. Comparison of the two structures of territorial governance.

	Campos de Cima da Serra	Province of Trento
Collective capacity of actors	Weak, no tradition of cooperation	Strong, old tradition of cooperation
Leading actors	Extension agents	Cooperatives, consortium, provincial government, advising entities, tourism promotion agencies, nature parks
Dynamics of public / private relations	Dependence of the producers on the extension agents; conflicts between producers, inspection services and municipal authorities	Cooperation in general; conflicts between producers and municipal authorities
Importance of public actors	Strong	Strong
Importance of private actors	Weak	Strong

Coordination between production and tourism sector	No	Strong
Tourist attendance induced by cheese	Weak	Strong
Basket of goods and services	Not structured	Structured around several cheeses, other local products and tourism
Governance form	Mainly public	Mixed

5.1.1. The Campos de Cima da Serra: a predominantly public form of governance characterized by a low propensity for collective action

As the empirical analysis has shown, the extension agents are the central actors of collective action, following a top down model. Producers are not fully involved, which leads to a low level of participation. Collective initiatives which are recent in the CCS, dating from the 2000s, correspond to four producer associations that aim at improving the legal status of the cheese. Additionally, a federation that aligns the associations was created in order to apply for the PDO. Although these initiatives were implemented through a top down model, some successful actions have been achieved, as for example the designation of the immaterial heritage, loans for dairy construction, PDO request and the signature of state laws to authorize the commercialization of the cheese at the state level (paper 1). Nonetheless, the recent collective dynamics in the CCS remain fragile, due to the lack of horizontal coordination between the private and public actors. The producers depend on the initiatives taken by the extension agents and they have never developed a habit of working together due to the former capitalist character of the production, which lasted until the 1950s. Indeed, the workers used to produce cheese for their subsistence and did not develop cooperation among the farms (paper 1). In addition, the local authorities and the inspection services are still little engaged in collective dynamics (paper 1, 2 and 4).

Moreover, the geographical area for the Serrano cheese production, envisaged by the PDO, is located on two different states: Santa Catarina (SC) and Rio Grande do Sul (RS) which have deployed independent strategies. In SC, there is a coordination between all the municipalities and dedicated technical support to the producers of Serrano cheese. Whereas in RS, the initiative involved only few municipalities which have mainly developed independent strategies. Moreover, there is no dedicated technical support to cheese production. Although

the extension agents remain the central actors of the governance in both states, collective dynamics appear more efficient in SC where stronger coordinated strategies have been implemented. Nonetheless, the creation of the federation as a second level for organization shows potentials in terms of coordination between both states (paper 2).

In addition, the analysis showed that there is a lack of coordination with the tourism promotion agencies. Rural tourism has developed since the 1990s, thanks to the development of the middle class in Brazil. Tourists who mainly come from big cities of the Southeast of the country (e.g. São Paulo, Rio de Janeiro) are attracted by the presence of the canyons and cold weather. In fact, tourism in the CCS is mainly based on landscapes and outdoor activities (e.g. hiking, rafting, climbing and fishing) and not on the promotion of the Serrano cheese. An example on the lack of coordination between the producers and tourism promotion agencies is the creation of the *Rota Turística* (“tourist route”) in 2019 crossing the CCS, which did not include the promotion of the Serrano cheese. Initiatives to propose tourism activities linked to the discovery of the Serrano cheese come from individual strategies of producers (for example, some of them developed Bed and Breakfast activities on the farm) (paper 1). Producers lack interlocutors to build more elaborate tourist services based on the valorization of their cheese. Informality seems to be the main break for coordination, although, some producers who have developed agritourist activities already have the SIM certification. Moreover, some other producers propose other typical products beside the Serrano cheese, such as wine, sausages, small fruits and jams. However, these do not constitute a basket, as the offer is not structured to sell the different products together (paper 1).

Consequently, the territorial governance form in the CCS is mainly public, in which the municipal extension agents are the engine of collective action. Frayssignes (2005) has shown that domination of one type of actor can unbalance power relationships between private and public actors and therefore contributes to conflicts related to the diverging interests or points of view. On one hand, the public form of governance can cause a gap between the implemented projects and the needs of local actors because of a lack of consultation with the population. On the other hand, private governance often leads to sectoral governance in which production is under the control of one or more private companies. They seek competitive advantages based on the domination of costs. This strategy often results in lower producer income (Frayssignes, 2005; Jeanneaux, 2018). This is the case for example of the Abondance cheese, where Lactalis produced 60 % of the cheese (Barjolle and Thévenod-Motte, 2002) or the Cantal cheese (Jeanneaux, 2018; Vollet et al., 2017).

5.1.2. The Province of Trento: a synergy between the different actors of the LAS in the form of mixed territorial governance

Cheese production in the province of Trento is mainly organized by producers grouped in multi-level cooperatives (first and second level). The cooperative model gathers more than 90 % of the milk producers of the province, whereas the rest of the producers confer their milk to mainly one private dairy. However, I chose to focus on the cooperative model due to its greater importance in the dairy economy of the province and because cooperatives are present all over the province area. The capacity of the producers for collective action has been developed over time. The producers had prior organizational experience and therefore have developed previous interconnexion. Indeed, cooperatives developed since the end of the 19th century and Alpine pastures are managed in common since the middle age (paper 3). The cooperative model enables the producers to have control on production and promotion of the cheese. This model allows to equitably distribute the added value and to develop a concerted supply management. Different levels of action were defined: first-level cooperatives, spread over the province, allow maintaining small scale production, while the joint coordination body (second level cooperative) controls the cheese production and promotion at the province level. In addition to the producers, public and private advisory entities (e.g. EMF, FBPT) are central actors in the territorial governance; They set up projects together with the producers to improve the quality of the cheese and to enhance its promotion (paper 5).

Tourism is highly relevant for the economy of the province. Indeed, the region Trentino-South Tirol is the second most visited region in Italy after the region of Veneto (ISTAT, 2018b). This attraction is due to mountains, with ski activities and the presence of the Dolomites, registered on the UNESCO world heritage (UNESCO, 2019). The local actors seized this opportunity and developed many initiatives to promote cheese among tourists. Since the 2000s, many events for tourists are coordinated between the cooperatives, summer farms and tourism promotion agencies for the discovery of the cheese (paper 3). Moreover, the three nature parks of the province play an important role in promoting cheese among tourists; they initiated partnerships with cooperatives and summer farms to organize tourist events. In addition, some summer farms organize cheese and butter-making demonstration one day per week for the tourists. After that, the association route of the cheese to the Dolomites was created in 2001 and corresponds to a tour to different dairy cooperatives and a tour to different summer farms, located in the Fassa, Fiemme and Primiero valleys (paper 3). In sum, even if the proportion of

tourists attracted by outdoor activities is still larger (e.g. ski), there are more and more tourists coming to participate in agritourist activities around cheese production.

Finally, the local actors developed a basket of goods, composed of several sorts of cheese. The Trentingrana is the leading product, as it is the most famous and the most important in terms of production. Moreover, in each valley, there are other traditional cheeses, which are generally bought in addition to a slice of Trentingrana. Furthermore, some other local products diversify the offer such as butter made from summer farm butter (*Botiró*), *speck*, honey, artisanal beer and small fruits. The different products are sold together, for example in cooperative stores or on summer farms.

In sum, in the province of Trento, there is an interesting system of mixed territorial governance, through the coordination among public and private actors. Mixed governance seems to be more successful for achieving collective action. Indeed, it brings a more balanced power relationship between the different actors and a higher capacity of initiative and decision of the producers. Many other examples of successful mixed territorial governance are highlighted in the literature such as the Beaufort cheese in the Alps or the Comté cheese in the Jura (Delfosse, 2003; Frayssignes, 2005; Jeanneaux, 2018; Lynch and Harvois, 2016). The Laguiole cheese in the French Massif Central is also an emblematic example of success in the creation of a products basket, where local actors have managed to create a complementarity between different goods and services and to create a TQR for all of these products (i.e. Laguiole cheese, knife, *Aligot*, rural accommodations, tourist routes, gastronomy) (Vollet et al., 2017).

5.1.3. The role of governments and administrative boundaries

The analysis revealed that governments are also important for achieving collective action in LAS. This requires listening and dialogue between local actors and governments in order to define institutional arrangements in public policies. Policies can involve legal frameworks for production legalization, but also technical (i.e. public advising or veterinary services), organizational (e.g. cooperative or association statutes) and marketing (e.g. labelling) support. In the province of Trento, provincial, national as well as European governments have favored cheese production and promotion over time (paper 3) (table 12). Moreover, the European Union (EU), in collaboration with the province of Trento implemented several measures for rural development in line with the second pillar of the Common Agricultural Policy (CAP). Most measures correspond to distribution of subsidies to support breeding activities in mountain areas (Province of Trento, 2017). Another measure is the LEADER

initiative which enables the creation of two LAGs in the province (Province of Trento, 2016). In the case of the CCS, informality represents an important break to the emergence of collective action, as the producers prefer to stay hidden to sell their cheese (paper 1). Governments bring little support to cheese production, and legal frameworks are often inexistent or not adapted to local reality, because of a lack of consultation of the local actors. This would however facilitate the process of legalization of the Serrano cheese. For example, the minimum maturing period of the Canastra cheese, a traditional raw milk cheese produced in Southeastern Brazil, has been shortened to twenty-two days in the state decree, after studies showed that cheese remains healthy for human consumption (IMA, 2013).

At the municipal level, the empirical analysis highlighted conflicts between municipal governments and producers in both case studies (paper 1, 2, 4 and 5). This seems to affect particularly the producers of the CCS, as municipalities have important competences, especially in terms of legalization. For example, some municipalities in the CCS do not employ an inspection veterinarian, which prevents the producers to enter in the legalization process for the SIM (paper 2).

Additionally, the analysis showed that the geographical area for cheese production does not necessarily match administrative boundaries (table 12). On one hand, the suitability of the boundaries in the province of Trento seems to have a facilitating role in cheese differentiation. The provincial government is closer to the local reality and provides institutional arrangements to support cheese production and promotion (paper 3). On the other hand, the CCS cover only a small area of the state areas. Moreover, the CCS are isolated and far from decision-making centers. Dialogue between the local actors and the state governments is almost inexistent. In addition, the production area suffers from a lack of coordination between the SC and RS states, which undermines collective action at the CCS scale (paper 2). Other case studies have shown that the production area can sometimes coincide with the reunification of several administrative regions, as in the case of the two Savoys in France. In fact, both departments led successful actions by a strong institutional coordination in order to implement joint projects for the promotion of the different cheeses (e.g. agriculture, tourism, research) (Frayssignes, 2005). Thus, before the suitability between the limits of the administrative regions and the geographical area of production, the success of cheese differentiation depends above all on how far it is a specific goal for the related governments and the capacity of these latter to listen and coordinate with the local actors to implement institutional arrangements more adapted to local reality.

Table 12. Role of the governments in localized collective action.

	Campos de Cima da Serra	Province of Trento
Administrative boundaries	Cut into two states (SC, RS), weak coordination	Match the geographical area for cheese production
Support from governments	Weak	Strong

The next section provides an analysis of collective strategies of cheese differentiation implemented in both study areas.

5.2. Collective strategies of territorial quality differentiation

To protect the collective benefits linked to the reputation of the cheese, the producers can organize themselves to design localized institutional arrangements. Localized institutional arrangements correspond to sets of rules, including monitoring and sanction mechanisms. They aim at protecting traditional practices and limiting counterfeiting which can damage the reputation of the cheese. In this sense, LAS can be assimilated to clubs. The empirical analysis has highlighted different strategies concerning the territorial quality differentiation of the cheeses in the CCS and the province of Trento, presented in table 13.

Table 13. Collective strategies of territorial quality differentiation.

	Campos de Cima da Serra	Province of Trento
Valorization strategies dedicated to cheese	Weak (request for the PDO certification)	Strong (PDO certification, collective brands, tourist routes, tourist events, promotion campaigns)
Suitability between the geographical areas of the PDO and the original territory of production	Weak (the territory is smaller)	Strong
Specifications	Not exigent and still not in place	Little exigent (no limit of production and feed supplement, and more productive breed use)
Local events dedicated to cheese	Weak (fest of the Serrano cheese only)	Strong (<i>Desmontegada</i> , many local cheese festivals)

5.2.1. The PDO certification as a common strategy of differentiation in LAS

The PDO is a formal certification framework, adopted worldwide, that allows non-relocation and valorization of a product linked to a specific territory. It makes it possible to formally establish the relationship between product quality and territory and to promote the products on external market, where establishment of close relationships with the consumer is not possible. The PDO certification is a common strategy aiming at valorizing products in LAS (Bowen and Mutersbaugh, 2013). There are other origin-related labels, such as the PGI that guarantees that one of the production steps takes place in the territory of origin. However, the link between the product and the territory is limited and the processing often takes place in a determined territory whereas the raw material comes from somewhere else (Ermann et al., 2017).

PDO is based on two exclusion mechanisms, which act as levers for the maintenance and / or enhancement of cheese reputation. The first exclusion mechanism corresponds to the delimitation of a geographical area for production. In the CCS, the analysis showed that the geographical area of the PDO and the original area of production do not match. In fact, there are no producers of Serrano cheese in the western part of the defined geographical area. Boundaries were delimited by the extension services according to climate and soil characteristics, but not by cultural attributes where the majority of the people comes from the Italian immigration and therefore has different traditions (paper 2). In the case of the province of Trento, the original production area and the geographical scale of the PDOs seem to match. Indeed, the Trentingrana cheese is traditionally produced over the entire province, matching with the PDO delimitation. The geographical area of the two other PDO certified cheeses are defined in more restricted areas, most often at the valley scale, corresponding to the original production area (paper 3). Sometimes, the geographical area of the PDO is larger than the original production territory. This is for example the case of the Abondance cheese, in the French Alps, where big dairy companies, originally located outside the territory, put pressure to increase the geographical area of the PDO. This resulted in the intensification of the production and the concentration of production within these big companies (Barjolle and Thévenod Mottet, 2002).

The second mechanism is to impose high level of requirement for the specifications, which provide sanctions in case of non-compliance, that protect the traditional and artisanal know-how for milk production and cheese making. The specification acts as a barrier of entry

and limits the possibilities of imposing a production model based on a strategy of domination by costs through economy of scale (Jeanneaux, 2018). In addition, formal rules often work in combination with social control, which tends to maintain the conformity of the practices of the producers to the norms of their social group. In the case of the CCS, the PDO certification was required in 2017 and is still in process (paper 1). However, the project emerged from the extension services and the producers were little integrated in the process. More generally, in Brazil, this tool is still little understood by the producers and the consumers (Vitrolles et al., 2011). Indeed, geographical indications, recognized since 1996, are part of a top-down model stemming from the World Trade Organization (WTO) and built independently from the productive actors (Cerdan et al., 2010b). In this sense, the top down model questions the efficiency of the certification in the CCS. In the province of Trento, PDO certification has been used since 1987, for the Trentingrana cheese in the first place. The certification process emerged from the productive actors, as they decided together on the specifications to be applied (paper 3). However, to be an operative tool of differentiation, the PDO requires strict rules of production. In the case of the CCS, the actual specifications do not provide strict rules to protect traditional practices. For example, the breeds as well as the animal feed are not specified. In the case of the province of Trento, there are actually three cheeses under the PDO certification. The Trentingrana cheese is under the tutelage of the Grana Padano consortium, applying the same specifications with the exception of the geographical area limited to the province of Trento, and the use of silage prohibited for the Trentingrana cheese. However, although 75 % of the forage should come from the geographical area, the specifications do not provide restriction concerning the use of local breeds, cow productivity and feed supplement. The Puzzone di Moena and Sprezza del Guidicarie cheeses have their own specifications but present the same limitations as the Trentingrana specifications. In other examples, the local actors decided to implemented stricter rules in order to protect the traditional practices and strengthen the links between the product and the territory. This is the case of the Beaufort cheese, in the French Alps where the actors decided to limit the production per cow to 5000 L per year, to use local breeds only such as the Tarine, and to strongly limit the use of supplement (Lynch and Harvois, 2016). Similarly, the actors involved in the Laguiole cheese production, in the French central massif have chosen the same strategy through strengthening the specifications and the choice of enhancing the local breed Aubrac (Vollet et al., 2017). Both systems appeared as a strong symbol of resistance of intensification. However, specifications can be sometimes modelled in favor of dominant actors, and lead to a loss of specificity which is the case of the Cantal cheese produced in the Massif Central in France. The PDO certification was first defined

in 1956 through strict specifications (e.g. restricted geographical area, Aubrac and Salers breeds only, pasture-based feeding and raw milk only). However, changes took place from the 1980s under pressure from larger companies, which settled down in the region. These are for example the integration of more productive breeds, corn silage, enlargement of the area to lowlands and pasteurization. This has the effect of distending the link to the territory and drastically reducing the remuneration of producers (Vollet et al., 2017). Facing these issues, the specifications were rewritten in 2007 with stricter rules, which resulted in the exclusion of several hundred of producers from the PDO certification (Jeanneaux, 2018).

Besides specifications, PDO is an interesting tool to control the supply and therefore the prices. In the province of Trento, the consortium defined a classification of the Trentingrana cheese according to the maturation level to segment the offer. There is also a system for removing cheese from the certification in case of non-compliance with the required organoleptic qualities. It appears in some cases that second level organizations define production quotas according to the demand, in order to guarantee a higher price of the cheese. For example, in the case of the Comté cheese, the joint coordination body defines production quotas for each dairy cooperative or dairy industry over three years. In the case of the Beaufort cheese, the number of cheeses is determined each year through a defined quota of casein plates (used to certify the cheese). Together with exigent specifications, the producers managed to obtain a higher price of milk, around 70 % higher than the average national price for the Beaufort cheese (Lynch and Harvois, 2016), and 20 % higher for the Comté cheese (Vollet et al., 2017). Indeed, Jeanneaux (2018) demonstrated that PDO can be a tool to generate higher added-value products in marginal areas. This requires a high level of requirement for the specifications and to supply controls, in addition to a restricted delimitation of the territory. In the case of the CCS, production is individual and there is no pooling of quality criteria. There is a strong heterogeneity of Serrano cheese sold mainly directly to regular consumers. As the demand for this product is today greater than the supply, and commercialization is mainly informal, collective control of quality and supply do not appear necessary. It is however possible that this question appears important in the future.

5.2.2. Other collective strategies of differentiation

In addition to the PDO, other strategies can be designed by the producers, as it is the case in the province of Trento. The consortium established internal specifications in 1990 to respond to a lack of strict rules for the PDO certified cheeses and formal rules for the non-PDO certified

cheeses. The rules include aspects related to milk production and cows feed, and define the cost of milk according to the quality. However, these internal specifications do not restrict the use of local breeds or the use of feed supplement, and do not determine the productivity level per cow. The lack of exigent rules led to an intensification of milk production. Indeed, some producers have increased their milk production by introducing more productive dairy breeds (e.g. Holstein) or relying on important quantities of supplement. Moreover, the move of lactating cows on Alpine pastures is not mandatory and today half of the lactating cows are not moved on Alpine pastures (paper 3). Even though intensification is less pronounced in the CCS, there is also an increasing number of specialized dairy farms (paper 1).

Another way of valorizing the products is the development of collective brands. In the case of the province of Trento, several brands were created by the government (e.g. *Qualità Trentino, Agritur Trentino*) (paper 3). These brands can sometimes be largely recognized more than PDO among the population. For example, the collective trademark *Genuss Region Österreich*, in Austria, created in 2008 by the ministry of sustainability and tourism, enjoys a greater acknowledgement than the PDO (Popp, 2010). However, the specifications of these trademarks do not have a high level of requirement. Independent organisms can also propose their own certification, as for example the non-profit organization Slowfood (Bérard and Marchenay, 2008). Slowfood certifies the Serrano cheese in the CCS (Slow Food Brasil, 2013), and the Trentingrana, Puzzone di Moena, Casòlet and Vezzena cheeses in the province of Trento (paper 3). Finally, communication and promotion campaigns can also be important for improving reputation of the cheese. In the province of Trento, the consortium led many promotion and communication activities since the 1980s (e.g. television commercials, posters in cities and sponsors of sporting events, such as ski competitions). Moreover, participation in competitions or exhibitions of national or international scope also helps enhancing the reputation of cheese linked to a specific territory (Dalpiaz, 2013).

5.3. Relational processes among producers

The analysis of relational structures allowed deepening the study on governance structures in LAS. Although, two different situations were studied, the relational analysis allowed drawing interesting lessons on collective action processes, especially among producers. In fact, a producers' association in the CCS gathering producers, extension agents, inspection veterinarians and local authorities was analyzed, while in the province of Trento, a dairy cooperative grouping only producers was studied. Table 14 provides the main findings on the relational analysis among the producers of the identified organizations in both case studies.

Table 14. Characteristics of the relationships between producers, members of a producers' association in the CCS and of a dairy cooperative in the province of Trento.

	Campos de Cima da Serra	Province of Trento
Organizational trust	Low	High
Reciprocity	Low	High
Prestige based actors	President	President
Hierarchy	Socio economic status	Not found
Conflicts	Certified vs non-certified producers	“traditional” vs “intensive” producers

In the CCS, relationships among the producers are characterized by low level of trust and reciprocity while trust and reciprocity among the producers in the province of Trento are high. The advice network structures among peers support these findings. In the CCS, the network was loose with many isolates, and there was no reciprocity (paper 4), while, in the province of Trento, the network was dense, with no isolates and reciprocity was high (paper 5). The analysis showed that organizational trust plays a crucial role for collective action. Indeed, this form of trust constitutes the basis for cooperation among the producers, belonging to different families and who do not necessarily have close relationships prior to collective action. Reciprocity is complementary to trust as it contributes to the development of long-term obligations between the producers and increases reputation. The cooperative has been created longer before the association, which may have contributed to develop higher level of organizational trust in the cooperative. Indeed, organizational trust strengthens with time, and requires for that frequent face-to-face interactions and the development of internal rules to formalize the commitment (e.g. total conferment of the milk to cooperatives in the case of the Province of Trento (paper 5)). In addition, other variables also appear to be crucial for the development of trust and reciprocity, such as long-term objectives and the size of the organization. First, the lack of perspectives concerning the legalization of the Serrano cheese can make the producers reluctant to engage in collective organizations. Second, a suitable size should allow regular face to face interactions among all the members, although it is always difficult to estimate the right size. However, both organizations had the same number of members (forty-seven) and all members knew each other, at least by name in the case of the CCS where interactions are low.

In addition, analysis on status among producers brought further interesting findings. Empirical analysis showed that in both studied organizations, the president is the most

prestigious member and has therefore the highest informal status. Prestige-based leaders can play a central role encouraging interactions among members and increasing cohesion as well as containing dissensions and enforcing rules (paper 4 and 5). Moreover, in both organizations, some producers are in brokerage position, where they play a central role in cohesion and information flow among separated individuals or within communities. In addition, the statistical analysis (ERGM) demonstrated that advice relationships among producers in the association depend on economic and social attributes: producers with a higher formal status were more sought for advice. This shows that there is a hierarchy, and therefore power relationships among the producers based on the formal status (paper 4). Whereas in the province of Trento, relationships do not depend on socio economic attributes, which means there is no hierarchy based on formal status among the producers, at least for advice (paper 5).

For both case studies, the empirical analysis brought to light conflicts among the producers. In the CCS, latent conflicts were observed between SIM certified producers and those who are not certified. In the province of Trento, conflicts were highlighted between the “intensive” and “traditional” producers. In territorial governance, conflicts are part of the processes. However, they need to be revealed through discussion to find solutions (Torre and Beuret, 2012). In the CCS, conflicts were rarely evoked by the producers and it has been difficult to obtain the information. This required spending more time with the producers and the extension agents. Conflicts were also uncovered thanks to other indices, as denunciation cases among producers. Moreover, the advice network analysis among peers allowed showing that certified producers are more in central position, exerting a hierarchy on the non-certified producers (paper 4). In the case of the province of Trento, the conflicts between “traditional” and “intensive” producers were usually evoked by the interviewed producers and other key actors. Each category of producers forms denser communities within the advice network (paper 5). However, to resolve the conflicts, the members implement rules, such as the definition of milk quotas with penalty in case of non-compliance in order to limit the intensification and prevent excessive production level differences among the farms. Moreover, the same number of “traditional” and “intensive” producers is part of the cooperative board of direction. As for the socio-economic status, it seems therefore that advice relationships are not shaped by the political status and coordination among the members appears to be horizontal (paper 5).

The analysis in terms of territorial proximity appeared valuable to understand how the different proximities can affect collective action and what proximities can be improved to increase interactions, and therefore organizational trust and collective action. First,

geographical proximity is a central element that allows increasing interactions. Indeed, the analysis showed that collective action is more successful when producers live close to each other. Moreover, mountainous conditions and the lack of transportation and communication infrastructures can exacerbate isolation which results in less involvement in collective action. In the case of the province of Trento, producers are gathered in villages, which allows regular interactions. Simultaneously, the analysis showed that the most isolated producers tend to be less involved in collective dynamics (paper 5). In the case of the CCS, the overall geographical isolation between the producers does not allow frequent interactions. Moreover, transportation and communication infrastructures are little developed in the CCS (e.g. the secondary axes are non-paved, there is no internet in rural areas), which increases functional distances between the producers (paper 1 and 4). Results also showed that producers located in central geographical location, in relation to the seat of the association or the cooperative, tend to be more active in the creation of advice relationships. This means that information seems to be concentrated around the seat of the collective organizations and to be diffused to more peripheral locations (paper 4 and 5). In addition, temporary meeting areas (e.g. cooperative assemblies, association meetings, cheese competitions), linked to the development of the belonging logic of the organized proximity, are important to increase interactions among producers. This is especially true for the CCS, characterized by a strong geographical isolation (paper 1). At last, interaction among the producers depends also on the similarity logic of the organized proximity, related to the participation to the cultural life. In the CCS, cultural events (e.g. rodeos contests) appear crucial to increase interactions. However, they are rare and do not compensate the permanent geographical isolation (paper 4). In the province of Trento, there are many festivals around cheese or transhumance, which are regularly organized and attended by the producers themselves (paper 5).

5.4. The role of the feeling of belonging, collective identity and collective action in territory construction

The empirical analysis has showed that the feeling of belonging of the producers in the CCS was high. This demonstrates that a high feeling of belonging does not necessarily allow a higher engagement in collective action. In fact, some producers interviewed in the CCS were not involved in collective action and demonstrate nonetheless a high attachment to the territory (paper 6). The same questions were asked to forty-five producers from the cooperative of Primiero in the province of Trento. The results have not been published yet, however, it appears interesting to present them in this section. It has been found that the feeling of belonging was

overall high in the province of Trento. The level of proudness of the territory got a median of 9 (from 2 to 10). Moreover, forty-two out of the forty-five producers could not imagine living somewhere else. However, it is important to note that the remaining three producers do not participate in every general assembly of the cooperative (out of the six in total who do not regularly participate). Furthermore, one of them gave the lowest mark concerning the level of proudness to the territory (2) and another one gave the third poorest mark (6). The results obtained from the province of Trento assume that a higher feeling of belonging allows a higher involvement in collective action. Feeling of belonging appears therefore to be a promising line of research to increase understanding on collective action in LAS. However, given the contradictions of the results of each case study, this would require further studies.

The feeling of belonging refers in reality to territoriality, which corresponds to the relationships with the space that everyone creates in terms of practices and representations (Brunet, 1990). In order to define the territoriality of the producers interviewed in the province of Trento, I asked them: “where do you feel you come from?” (Di Méo, 1996). Thirty-eight out of the forty-five producers answered they come from the municipality where they live. Four producers answered from the valley where their municipality is located and three others from the province of Trento. This reveals that there is a multitude of territorialities, according to the practices and representations of each producer. The territory is generated by the superposition of the various personal territorialities and corresponds to the global expression of every territoriality that shapes collective identity (Di Méo, 2002; Di Méo and Buléon, 2016). Nonetheless, besides the material and ideal dimensions included in territoriality and collective identity, territory also includes an organizational dimension, a reflection of collective action. At the end, the combination of collective identity and collective action allows drawing the delimitation of a territory. Thus, the province of Trento appears to be a pertinent territorial scale. Indeed, the people of the province share the same identity and the collective action is organized over the entire province through cooperatives and a coordination body (i.e. the consortium). On the other side, in the case of the Serrano cheese, the territory appears smaller than the defined geographical area. Indeed, in the Southeastern part of the CCS, people have different cultures (i.e. Italian immigration) and do not make Serrano cheese (paper 2).

Moreover, the empirical analysis showed that collective action achievement depends on the representations that the producers make of their identity, thus, it appears decisive for collective action achievement that producers carry positive values of their identity. In the case of the CCS, results showed that positive representations promoting the identity of the

producers, their product and their territory, increase engagement in collective action (paper 6). Consequently, collective identity appears to be crucial as it could allow achieving a shared vision of the territory and facilitate the implementation of collective action among actors (Callois, 2006). In addition, it is likely to become a specific resource for the promotion of the cheese (François et al., 2013). These results provide the beginning for a broader reflection on the role of collective identity in collective action from a territorial perspective. However, the analysis was only conducted in the CCS and further research appears necessary to deepen the understanding.

5.5. Testing of the hypotheses

From the results of the two case studies and the other examples added to the discussion, it is now possible to confirm or reject the specific hypotheses that were formulated in the introduction. The results are presented in table 15.

Table 15. Testing of the hypotheses.

General hypotheses	Specific hypotheses	Results
H1. Coordination among local private and public actors and support from higher administrative levels are crucial to the success of collective action for cheese differentiation.	H1a. Collective action tends to be more efficient when there is a strong coordination between local private and public actors (mixed form of governance).	Confirmed
	H1b. Multilevel institutions and organizations increase coordination and cooperation among the actors of the LAS.	Confirmed
	H1c. Collective action tends to be more efficient with a unified administrative context over the territory.	Confirmed. However, it depends above all on how far it is an objective for the governments.
	H1d. Collective action is a long-term process and is facilitated by the habit of working together.	Confirmed
	H1e. Agritourism is central for cheese differentiation and requires coordination	Confirmed

	between actors promoting tourism and those involved in the production.	
H2. Collective strategies for cheese differentiation require the design of local institutional arrangements.	H2a. The boundaries of the geographical area of production should match the original area of production related to a specific culture.	Confirmed
	H2b. The differentiation process requires the definition of exclusion mechanisms, through the design of exigent production rules and sanctions to protect and enhance the reputation of the cheese.	Confirmed
	H2c. The local institutional arrangements must be defined by the local actors themselves to be efficient in protecting and enhancing the cheese reputation.	Confirmed
H3. Successful collective action among producers of a collective organization requires horizontal relationships and shared norms.	H3a. High level of organizational trust and reciprocity, reflected by dense networks among producers, are instrumental to achieve collective action.	Confirmed
	H3b. A lack of hierarchy regarding the socioeconomic status of the producers is more likely to increase cooperation, and therefore collective action.	Confirmed
	H3c. Collective action achievement requires revealing and resolving the conflicts through rule design.	Confirmed
	H3d. The presence of leaders based on prestige tends to facilitate collective action.	Confirmed
H4. Geographical and organized	H4a. Producers living in villages are more likely to interact than isolated producers.	Confirmed

proximity allow for greater interactions, trust, and therefore collective action.	H4b. Producers that are geographically isolated tend to participate less in collective action.	Confirmed
	H4c. The creation of temporary meeting areas through belonging logic are crucial to increase face to face interaction.	Confirmed
	H4d. Participation in cultural events increases interactions.	Confirmed
H5. Producers' representations of identity and a strong feeling of belonging to the territory are linked to the degree of involvement in collective action.	H5a Positive representations of identity allow greater involvement in collective action.	Confirmed for one case study, but would require further research
	H5b. A strong feeling of belonging to the territory allows greater involvement in collective action.	Requires further research

In addition to the main objective and the related hypotheses formulated, one additional question refers to how mountain cheese LAS can respond to the challenge of territorial development. In order to bring some answers, I formulate indicators to assess the different dimensions of territorial development in the next section.

5.6. The role of mountain cheese LAS in dynamics of territorial development: identification of indicators

In this section, I emphasize the propensity of LAS to promote territorial development, in the specific context of mountain cheese production. For that, I provide different indicators from different dimensions (table 16). First, the economical dimension gathers indicators based on the evolution of the price of the cheese over time, its comparison with similar cheeses and the added value distribution among the actors involved in the production. Because of a lack of official data, the evolution of the price of the Serrano cheese was obtained empirically through interviews of sixty-seven producers. However, the economic dimension of territorial development is only one facet of the process, and it appears necessary to consider also the social, cultural and environmental dimensions (Vollet et al., 2017). The indicators chosen for the social dimension concerns the employment opportunities offered by the LAS. More specifically the indicators correspond to the percentage of producers recently settled and to the

direct and indirect jobs induced by cheese production. Due to a lack of official data available, the number of the new settlements was also obtained empirically through the interviews of sixty-seven producers in the CCS and forty-five in the province of Trento. At last, the cultural and environmental dimensions highlight the positive values of livestock grazing and the related mountain cheese production. The objective of the assessment is not to obtain precise quantitative data, but to obtain general trends for each dimension and therefore to get an idea of territorial development dynamics for each case study. At the end, it is to link these dynamics with collective action achievement for cheese differentiation.

Table 16. Outcomes of each LAS on territorial development.

Dimension	Indicator	Campos de Cima da Serra	Province of Trento
Economic	Evolution of the price of cheese between 2008 and 2018	Serrano cheese: +186.34 % (7.10 R\$/kg to 20,33 R\$/kg) (source: interviews, paper 1) With inflation indexation: +51.2 % (13.40 R\$ to 20.33 R\$)	Trentingrana cheese: +11.3 % (8.38 €/kg to 9.33 €/kg) (Clal, 2019) With inflation indexation: -5.7 % (9.86 € to 9.33 €)
	Comparison of the price with similar cheese between 2008 and 2018	Canastra cheese: 8 R\$/kg to 40 R\$/kg (Barbosa, 2007; Bedim et al., 2011, Crouzoulon, 2019 ; Goncalves Mota, 2017, Villas Boas Simoncini, 2017)	Parmigiano Reggiano: 8.17 €/kg to 11.00 €/kg (average of +3.3 % over the period compared to the Trentingrana cheese) (Clal, 2019)
	Added-value distribution	The entire added value goes to the producers, who produce the milk, process into cheese and sell directly.	The price of the milk is fixed on the difference between the added value from the sale of cheese and the costs of cheese processing and maturing. A high percentage of the cheese are sold directly in the producers' stores (e.g. 34 % of direct marketing at the

			cooperative of Primiero and 12 % on the three summer farms managed by the cooperative that have agritourism activities). The remaining part of the cheese is sold by the consortium.
Social	Settlement of farmers from 2008 to 2018	0 %	17,8 %
	Jobs induced by cheese production	Individual processing	- direct: cooperatives, consortium, summer farms - indirect: tourism
Cultural		Preservation of know-how and traditional practices Identity Gastronomic heritage Nutritional and organoleptic quality of the cheese	
Environmental		Landscape management Biodiversity (permanent pastures, breeds) Carbon storage Water regulation Erosion prevention Avalanche prevention	

From an economic point of view, the added value mainly goes to the producers in both case studies. In the CCS, the milk producers are also responsible of the processing and the marketing of the cheese, whereas in the province of Trento, the processing and marketing is under the control of the producers by mean of cooperatives. The price of the Serrano cheese has increased significantly in ten years and has almost tripled. When considering the inflation indexation, the price has increased of more than 50 %. However, the comparison with a similar cheese, the Canastra cheese, shows that the potential selling price could be even greater. The Canastra cheese is a raw milk cheese produced in the Serra da Canastra, in the State of Minas Gerais in Brazil. The Canastra and Serrano cheese had similar price level in 2008. However, the price of the Canastra cheese increased much more during the last years, attaining today an average price of 40 R\$ per kg. In fact, collective action and strategies of differentiation have

been engaged in the Serra da Canastra earlier than in the CCS and the Canastra cheese has gained much more fame in Brazil. Thanks to the actions of the producers' association APROCAN, a legal framework authorizing the marketing in the state of Minas Gerais was signed in 2002 and across Brazil in 2018 (State of Minas Gerais, 2002; 2018). Moreover, the cheese got the PGI in 2011 (INEA, 2011) and producers have recently engaged in the PDO certification process. Concerning the Trentingrana cheese, the price did not increase meaningfully and even decreased with inflation indexation between 2008 and 2018. Collective strategies have been initiated since the 1970s and the cheese today enjoys a high level of reputation in Northern Italy. The milk price is 36 % higher compared to the average national price (paper 3). In comparison, the Parmigiano Reggiano cheese is a kind of Grana cheese produced in the Emilia-Romagna region which obtained the PDO certification in 1996. The specifications are similar to the ones provided for the Trentingrana cheese in terms of the production rules (e.g. 75 % of the forage should come from the geographical area) and the supply management (e.g., segmentation of the offer according to the maturing time and downgrading in case of non-compliance with quality rules). However, the Parmigiano Reggiano cheese gained a greater national and international fame. Indeed, although 90 % of Italian households consume this cheese, it is also famous abroad, since 39 % of production was exported in 2017 (Jeanneaux, 2018). On the contrary, the Trentingrana cheese is mainly consumed locally (65 % is sold in the regions of Trentino-Alto Adige, Veneto and Lombardy) and 4,5 % is exported (Concast, 2019). Although price differences are small, the Parmigiano Reggiano cheese was 3 % more expensive over the period compared to the Trentingrana cheese (Clal, 2019). These results show that the reputation of the cheese, which develops through the implementation of collective strategies, seems to positively affect the price. Moreover, the price is a reflection of the TQR, when the added value accrues to the productive actors of the territory. In this sense, a higher TQR should lead to a higher satisfaction of their needs (Campagne and Pecqueur, 2014). However, it is important to remember that the price of the cheese depends at the end on the willingness to pay of the consumers. When the price is getting higher, there is a risk that the cheese targets those who can afford it and higher educated classes of the population (Ermann et al., 2017). This is especially true in Brazil where social inequalities are strongly marked.

From a social point of view, the two LAS face different dynamics. First, the empirical analysis shows that in the province of Trento, there is a higher rate of settlement compared to the CCS, where no settlement was recorded between 2008 and 2018. This testifies of a higher capacity

of the province of Trento to attract new farmers. This trend can be explained by two factors: i) the price of the milk in the province of Trento is higher than the national price (36 % higher) (paper 3), ii) producers aged under forty can obtain financial support from the province and the EU to set up a new farm (Province of Trento, 2020). However, the process of abandonment has been high in the province over the last decades. There was a drop of 55 % in the number of dairy farms between 2000 and 2018 (ISTAT, 2018). Many farmers either ceased their activity or did not find any succession. This drop in activity was not compensated by the settlement of new farmers. In the CCS, there is also a strong process of abandon of breeding activities, however official data are not available. The empirical analysis shows that only 54 % of the sixty-seven interviewed producers will have a succession in the future. This means that almost half of the farms will close, once the producers will cease their activity. In addition, both LAS differ in their capacity of offering direct and indirect jobs related to cheese production. In the CCS, cheese production creates few direct jobs and does not create indirect jobs. In fact, cheese production and marketing are entirely conducted by the producers and there is still no tourist activity linked to the Serrano cheese. Whereas in the province of Trento, production of cheese induces a higher number of jobs, first in the cooperatives (for example, the cooperative of Primiero provides seventeen jobs), in the consortium, which provides sixty-seven jobs, as well as on the summer farms which are about 300 in the province. For example, the four summer farms managed by the cooperative of Primiero employ together eleven shepherds. The activity also creates many indirect jobs linked to tourism and gastronomy. There are today thirty summer farms with agritourism activities. The four summer farms managed by the cooperative of Primiero employ together eighteen workers for agritourist activities. Thus, the organization structure of the production and the promotion via agritourist activities in the province of Trento is more efficient in job creation. However, in general, in the CCS and the province of Trento, agricultural employment remains low compared to the secondary and tertiary sector (IBGE, 2018a; ISTAT, 2018c).

From a cultural and environmental point of view, livestock grazing systems and related cheese production provide many positive values to the territory in both case studies. On the cultural level, the production of cheese plays a central role in the preservation of know-how and traditional practices, tacitly transmitted from generation to generation. In addition, the maintenance of such activities has a role in preserving and valorizing the identity and way of life of local populations. Moreover, cheese greatly contributes to the gastronomic heritage of these territories, and festivals around cheese play an important role in valorizing the local

culture. Last but not least, pastures have positive impacts on the nutritional and organoleptic quality of the cheese.

From an environmental point of view, mountain cheese production makes it possible to value grasslands located in marginal areas. Mountain pastures have an important role in the maintenance of typical landscapes and biodiversity. The use of local breeds also allows enhancing biodiversity. There are other positive effects linked to grazing, such as carbon sequestration, regulation of the water cycle and erosion prevention. Moreover, in the province of Trento, pastoralism is important in preventing avalanches and is therefore complementary to skiing leisure. However, the environmental values provided by livestock depend mainly on the practices adopted. The enhancement of such positive values therefore requires the establishment of exigent production rules.

In sum, added value benefits first to the producers of both areas, as it controls the different steps from milk production to marketing, passing by cheese processing. The price of the Serrano cheese increased greatly in the last years compared to the Trentingrana cheese. However, it is difficult to only judge on the effect of price on territorial development. Indeed, we observe that social dynamics, concerning employment, seem poorer in the CCS than in the province of Trento. Moreover, the CCS is still sorely lacking of public infrastructures that affect the well-being of the local population. Nonetheless, the potential price of the Serrano cheese, and therefore the resulting TQR, might be increased in the future, thanks to further collective strategies of differentiation. This may turn the activity more attractive for succession or new producers. Last, both production systems bring many cultural and environmental values. Nonetheless, this requires the establishment of exigent rules to protect traditional practices and the artisanal character of the production. The role of mountain cheese LAS in territorial development therefore greatly depends on the capacity of the local actors to act collectively to implement strategies that aim at enhancing the reputation of the cheese, but also on support from governments.

Conclusion and perspectives



Figure 18. Zipline for milk transport in South Tyrol, Italian Alps (source: own photo, 2019).

In order to avoid cost competition imposed by the global market, local actors in marginal rural areas can highlight the specificities of their territory to propose typical products and services. This requires that the actors act collectively. The present thesis focused on collective action in mountain cheese LAS. It provided an analysis of two contrasting territories in Southern Brazil and in the Italian Alps. The Italian case study appears to be an example of success of long enduring collective action, although some problems were outlined, while the recent collective dynamics show many limitations in the Brazilian case. This chapter presents an overview of the principal findings and opens perspectives for the future.

Principal findings

This thesis concludes that a mixed form of territorial governance including public and private actors, as observed in the province of Trento, seems to be more favorable for collective action. Moreover, multilevel institutions and organizations allow a greater coordination among the different actors of the territory, whereas a public form of territorial governance based on a top down model does not allow a high level of participation of the producers, as it has been described in the CCS. In addition, there was a lack of coordination between the different local initiatives, which impedes the development of collective action at the territorial level. The differentiation process requires developing a tourist offer around the cheese. Tourism promotion agencies should be therefore active actors of the governance, as it was the case in the province of Trento. Last but not least, governments play an important role in enabling local collective action by defining policies, which includes legal frameworks and technical, organizational or marketing support. The success of collective dynamics depends above all on how far it is an objective of the governments to support cheese production. In the case of the CCS, the absence of adequate legal frameworks for the Serrano cheese commercialization appears to be the main obstacle to a greater engagement of the producers in collective dynamics.

Local actors can develop a diversity of strategies to differentiate the cheese. In LAS, the territorial quality differentiation process should improve the reputation of the cheese, which is seen as a club good due to its exclusion dimension. In order to enhance the reputation, the actors of the LAS must design their own localized institutional arrangements which correspond in fact to specifications. Specifications include exigent production rules and sanction mechanisms as well as the definition of a restricted geographical area of production. The lack of exigent specifications in both case studies leads to intensification issue, especially in the province of Trento, which can result in a loss of specificity of the cheese.

The analysis of the relational processes between producers within a collective organization allowed showing that organizational trust is the crucial element that allows achieving collective action. In the CCS, there was a lack of trust and no reciprocity in opposition to the case in the province of Trento where trust and reciprocity had a high level. Regular face to face interactions represent an important lever for increasing trust. In addition, prestige-based actors, who were both presidents, play a central role in cohesion. Interesting findings concern hierarchy and power relationships based on socio economic and political status. In the province of Trento, there was no hierarchy based on status, while in the CCS, a hierarchy was detected. At last, in both cases, there were conflicts between the different groups of producers. However, in the province of Trento, producers were able to agree on the establishment of internal rules to resolve them.

Territorial proximity is an interesting framework to understand dynamics of cooperation within a territory. Regular face-to-face interactions, which enable trust establishment, are facilitated when producers are gathered in villages. Isolation makes it difficult to establish trust and participate in collective dynamics. However, transport and communication infrastructures are crucial elements to counter geographical isolation. In addition, professional meeting areas and participation to cultural events seems instrumental to increase interactions, trust and therefore collective action.

A pertinent territory scale is delimited through the combination of collective identity (material and ideal dimensions) and collective action (organizational dimension). Collective identity should hold positive values to achieve a shared vision and facilitate the implementation of collective strategies. Moreover, it seems obvious that feeling of belonging is a central condition to engage collective action. However, the results did not allow confirming this statement and further research is needed to better prove the link between feeling of belonging, identity and collective action.

Last, collective action success for territorial quality differentiation of cheese can lead to a virtuous process of territorial development in such marginal rural areas. It may first increase the TQR among the actors of the territory and therefore increase the satisfaction of their needs. Moreover, territorial development brings larger dimensions as it allows maintaining populations in mountain areas, offering job opportunities. It also provides the valorization of cultural, identity and environmental attributes of prime importance for the

sustainability of LAS. At the end, these different dimensions are the keys to the well-being of the local populations.

Final considerations and perspectives

Cheese represents an important development lever for mountain areas in both Southern and Northern countries. It stands at the core of broader economic, social, cultural and environmental dynamics. In fact, it significantly contributes to avoid rural depopulation and land abandonment in marginal rural areas. In addition, natural resources, traditional know how and identity, become specific resources in such agrifood systems. Moreover, LAS offer new forms of tourism that enhance the cultural and environmental heritage of these territories. Nonetheless, the process of differentiation requires that the local actors act collectively. The analysis showed that in Europe this process has begun since the early times of the “modernization” of agriculture, with examples of success and failure. However, in southern America it is recent and may require time to reach success. In fact, there is no universal recipe for territorial development but it is largely context dependent and based on a trial and error process. Nonetheless, it requires at any time a strong engagement of the local actors and the recognition by governments of the potential role of such agrifood systems for rural development.

Territorial development model does not correspond to a simple adaptation of marginal rural areas to globalization and its effects of underdevelopment, however it stands as an alternative model. Indeed, LAS can contribute to a radical transformation of the food system toward sustainability and can overcome the negative effects and failures of neoliberalism. In fact, LAS correspond to an alternative to capitalism, as it is not dominated by a logic of capital accumulation but aims at improving conditions for the rural populations. It promotes most of the time family farming, cooperative or associative model. LAS rely more on local available resources and are less dependent on external resources. In doing so, local actors are more able to face price volatility. Moreover, the existence of a specific demand on new markets allows a better price valorization for the products. However, it is important to note that specialization of LAS in one leading product may undermine their resilience. Nonetheless, the actors in LAS have a higher control on the production, processing and marketing which provides a fairer distribution of the added value. At the same time, LAS propose a new way of producing, distributing and consuming, which is based on democratic forms of governance on one hand; and on a sustainable valorization of local resources on the other hand. In fact, this agrifood system aspires to more harmonious nature-society relations as well as more solidarity among

people. Nonetheless, transformation of agrifood systems toward sustainability should not involve marginal rural areas only, but it should be rather a common goal for the world agrifood systems through for example the development of agroecological farming.

This dissertation aimed at deepening knowledge on territory-based collective action in LAS. It intended to improve scientific knowledge, but also professional practices and public action in favor of territorial development of marginal rural areas. Future directions would consist in deepening and developing research. The first research avenue involves emphasizing better the analysis of the complexity between territory and collective action. Thus, the ideal dimension would require in-depth research to better understand its role in collective action. Indeed, the ideal dimension is complex to grasp, although I tried to include territoriality and identity into the analysis. Moreover, deepening the political dimension and in particular the question related to hierarchy could shed additional light on issues on relational processes. In addition, further studies should provide deeper understanding on the relationships between collective action dynamics and territorial development outcomes. The second research avenue focuses on the implementation of participatory approaches to support the local actors in the design, implementation and evaluation of their projects. This would, on one hand, strengthen their capacity of project implementation and, on the other hand, open up perspectives for providing new knowledge for collective action.

The objective of this thesis was to participate in the understanding of localized agrifood systems and their collective dynamics. I also hope that this thesis has opened up new research perspectives.

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Appendices. Full papers

Paper 1 Pachoud, C., Schermer, M., 2019. Reconciling Tradition and Innovation in Traditional Mountain Cheese Value Chains: The Role of Social Capital. The Case of the Artisanal Serrano Cheese Value Chain in Southern Brazil. In: E. Landsteiner and T. Soens (Eds.), *Farming the City. The Resilience and Decline of Urban Agriculture in European History*. Innsbruck/Wien/Bozen: Rural History Yearbook 16, pp. 189-217.

Paper 2 Pachoud, C., 2020. The quality of territorial governance: an assessment of institutional arrangements. The case of the Serrano cheese production in the Campos de Cima da Serra, Southern Brazil. *Die Erde* 151(1): 23-36. <https://doi.org/10.12854/erde-2020-424>

Paper 3 Pachoud, C., 2020. Collective action for cheese valorisation in the province of Trento/Italian Alps: an institutional approach. *Journal of Alpine research* (under review, second revision).

Paper 4 Pachoud, C., Labeyrie, V., Polge, E., 2019. Collective action in Localized Agrifood Systems: An analysis by the social networks and the proximities. Study of a Serrano cheese producers' association in the Campos de Cima da Serra/Brazil. *Journal of Rural Studies* 72: 58-74. <https://doi.org/10.1016/j.jrurstud.2019.10.003>

Paper 5 Pachoud, C., Delay, E., Da Re, R., Ramanzin, M., Sturaro, E., 2020. A Relational Approach to Studying Collective Action in Dairy Cooperatives Producing Mountain Cheeses in the Alps: The Case of the Primiero Cooperative in the Eastern Italians Alps. *Sustainability* 12(11): 4596. <https://doi.org/10.3390/su12114596>

Paper 6 Pachoud, C., 2019. Identity, feeling of belonging and collective action in localized agrifood systems. Example of the Serrano cheese in the Campos de Cima da Serra, Brazil. *Cahiers Agricultures* 28(28). <https://doi.org/10.1051/cagri/2019028>

Carine Pachoud / Markus Schermer

Reconciling Tradition and Innovation in Traditional Mountain Cheese Value Chains: The Role of Social Capital

The Case of the Artisanal Serrano Cheese Value Chain in Southern Brazil

Abstract: Globalised and production-oriented agriculture often leads to the exclusion of rural mountain areas and to the marginalisation of their traditional food value chains, of which cheese is particularly interesting. Important elements for such value chains are the valorisation of the product quality and of traditional know-how. Territorial innovations, defined as a response to a problem identified collectively in a territory, allow adaptation to changes. Reconciling tradition with territorial innovation is central for the resilience of the value chain and social capital is the resource that needs to be mobilised to cooperate and innovate. In this contribution, we analyse the history of the artisanal Serrano cheese in southern Brazil. The aim of this article is to analyse strategies for building a resilient artisanal Serrano cheese value chain by studying the role of social capital in the balance between maintaining traditions and the emergence of territorial innovations. In the results, first, we observe that the peasant families are central actors in maintaining tradition by passing on know-how to the next generations through bonding social capital. Second, the agricultural advisory services (EMATER-RS and EPAGRI-SC) are the central actors in the innovation processes by diffusing technical innovations, but also for the emergence of organisational innovations through the creation of producers' associations. The associations allow connecting the different actors of the value chain through linking and bridging social capital, necessary for territorial innovation to emerge.

Key Words: tradition, territorial innovation, social capital, mountain cheese value chains

Introduction

Globalised and production-oriented agriculture often leads to spatial inequalities and exclusion of peripheral rural regions; often, rural mountain areas experience a delay in their development compared to more advantaged agricultural areas.¹ Consequently, the dominant agro-

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food system contributes to the marginalisation of traditional food value chains, like those of artisanal cheeses, often located in rural mountain areas. Indeed, livestock grazing

is a common activity for most mountain communities because it makes use of non-arable areas. This activity has multiple economic, social, and environmental functions, often linked to other rural, but also urban, activities.² Moreover, livestock farming has a central place in maintaining the socio-cultural traits of these territories, in preserving traditions.³ In addition, cheese represents an essential source of food and income for various mountain populations. At the same time, the quality and distinctiveness of the cheese, most of the time made from raw milk, confer an added value on milk and often become a cultural object.⁴ In fact, the cheese value chains are firmly anchored in various dimensions of history, identity, and culture, as well as being community-based and collectively organised activities.⁵

Such traditional value chains are linked to the concept of territory,⁶ defined as “a developed area, socially constructed, culturally labelled and institutionally regulated”.⁷ Indeed, these value chains are considered territorialised systems, meaning that they are localised in a defined space and represent a group of actors with a specific identity. The term “actor” denotes any individual who intentionally participates in activities with territorial implications and who is capable of reflexivity.⁸ The valorisation of product quality and of traditional know-how, as well as control over technical innovations, are important elements in these value chains. Major elements of governance include horizontal coordination between local actors, which implies the cooperation of the actors operating in this territory.⁹

In the context of globalisation, it is necessary to pay special attention to marginalised territories such as rural mountain areas and to turn them into dynamic spaces in order to increase the well-being of local populations¹⁰ and thus avoid depopulation. Indeed, rural mountain areas are usually difficult to access and far away from political decision-making, with infrastructures that are poorly developed. These areas can hardly compete with urban and more developed rural regions concerning generic resources (e.g. labour, wages, and infrastructures).¹¹ Nonetheless, globalisation at the same time provides new paths forward for these territories through endogenous development based on local resources, local cul-

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- 1 André Torre/Dominique Vollet, *Aux fondements du développement territorial*, in: André Torre/Dominique Vollet (eds.), *Partenariats pour le développement territorial*, Versailles 2016, 11–32.
 - 2 Laurent Dobremez/Dominique Borg, *L'agriculture en montagne – Évolutions 1988–2010 d'après les recensements agricoles (Agreste Les Dossiers 26/July 2015)*, Grenoble 2015.
 - 3 Martin Price, *Mountains: A very short introduction*, Oxford 2015, 83–84.
 - 4 Claire Delfosse, *La localisation de la production fromagère. Évolutions des approches géographiques*, in: *Géocarrefour* 81/4 (2006), 311–318.
 - 5 Evander Eloí Krone, *Identidade e cultura nos Campos de Cima da Serra (RS): práticas, saberes e modos de vida e pecuaristas familiares produtores do queijo serrano*, Porto Alegre 2009.
 - 6 Roger Brunet, *Le territoire dans les turbulences*, Montpellier 1990.
 - 7 Elisabeth Lopez/José Muchnik, *Petites entreprises et grands enjeux: le développement agroalimentaire local*, Paris 1997, 23.
 - 8 Guy Di Méo, *Introduction à la géographie sociale*, Paris 2014, 86–89.
 - 9 Jorge Jordana, *Traditional foods: challenges facing the European food industry*, in: *Food Research International* 33/3–4 (2000), 147–152.
 - 10 Torre/Vollet, *Aux fondements*, 11.
 - 11 Gabriel Colletis/Bernard Pecqueur, *Révélation de ressources spécifiques et coordination située*, in: *Economie et Institutions* 6–7 (2005), 51–74.

tures and identity, in order to offer specific and differentiated goods and services.¹² For this, increasing participation of the local population in decision making and innovation processes is needed, based on the legitimacy of territorial governance, which involves the local actors in the definition of common projects for future development.¹³ Here, innovations are territorial, meaning that they are a response to a problem or a need identified collectively in a territory, with the aim of improving well-being and supporting sustainable local development.¹⁴ Such innovations call on the inventiveness of local populations. They are set up and adopted by the networks of actors and are not only technical, but also social, organisational, or institutional.¹⁵

Cooperative relations between actors are a central element of governance. They allow communication, better reflexive capacity, and circulation of information in order to make better decisions. Social capital, understood as the “norms and networks that facilitate collective action”,¹⁶ is the resource that needs to be mobilised to cooperate and innovate. This requires two forms of social ties: first, strong ties connecting individuals who are close (family, friends) and socially homogeneous; second, weak ties linking individuals who are more distant, dissimilar in a demonstrable fashion, and have different occupational status.¹⁷ Marginalised mountain territories often lack the combination of these two forms of social capital, a shortcoming which restricts their innovations and information flows due to organisational issues and leads to difficulties in developing endogenous projects.¹⁸

The aim of this study is to better understand the role of weak and strong ties in reconciling tradition and innovation. It is based on a historical analysis that provides insights into the foundations of the current configuration of the value chain. We aim to uncover the conditions of its development, its tradition, as well as its potential and limitations for innovation. We focus on the case of artisanal Serrano cheese, a traditional mountain cheese in southern Brazil. Serrano cheese is produced by peasants and sold to end consumers either directly or via traders. However, this chain remains informal; the cheese sales have even become illegal as a result of changed consumer preferences and new hygiene standards incompatible with small-scale and artisanal production.

The article is structured as follows: the initial sections outline the conceptual framework. After defining the notion of “peasantry” and the role of social capital in shaping the relationships of the various actors involved, we explore the importance of tradition and territorial innovation for development. Then, after describing the material used in the case study, we present the area, the production systems, and the current situation of the Serrano cheese value chain. Subsequently, we narrate the historical development of this value chain in four periods. The first two periods (1700–1825 and 1825–1950), corresponding to the origins of Serrano

12 Bernard Pecqueur, *Qualité et développement territorial: l'hypothèse du panier de biens et de services territorialisés*, in: *Économie rurale* 26/1 (2001), 37–49.

13 André Torre, *Théorie du développement territorial*, in: *Géographie, économie, société* 17/3 (2015), 273–288.

14 Akim Oural, *L'innovation au pouvoir! Pour une action publique réinventée au service des Territoires*. Rapport établi avec l'appui du secrétariat général pour la modernisation de l'action publique, Paris 2015, 7.

15 Torre/Vollet, *Aux fondements*, 19.

16 Michael Woolcock/Deepa Narayan, *Social capital: implications for development theory, research, and policy*, in: *The World Bank Research Observer* 15/2 (2000), 225–249, 226.

17 Nan Lin et al., *Social resources and strength of ties: Structural factors in occupational status attainment*, in: *American Sociological Review* 46/4 (1981), 393–405; Mark Granovetter, *The strength of weak ties: A network theory revisited*, in: *Sociological Theory* 1 (1983), 201–233.

18 Torre/Vollet, *Aux fondements*, 11–12.

cheese production and the beginning of its trade, allow a better understanding of the later developments. The two more recent periods (1950–2000 and 2000–today) correspond to the diffusion of technical innovations and the emergence of collective organisation within the value chain, and are presented through the lens of social capital. Finally, the discussion and conclusion connect the historical development with the aspirations to territorial innovation which shape the current situation.

Theoretical framework

Building resilience of traditional mountain cheese value chains: the role of social capital

Endogenous organisations provide the capacity to resist economic pressure.¹⁹ In this sense, peasant farming and traditional production are interesting objects for the study of resilience, because peasants preserve and transmit know-how from generation to generation and encourage a focus on the quality of products instead of quantity by not following the economic mainstream. Before continuing our case study, we will define “peasant”, a term that seems more appropriate for this context than “farmer” or “smallholder”. The definition given by Shanin assigns the following features to “peasantry”:

“The family farm as the basic multi-functional unit of social organisation, soil management and usually animal rearing as the main means of livelihood, a specific traditional culture closely linked with the way of life of small rural communities and multi-directional subjection to powerful outsiders”.²⁰

Also, peasantry is typically characterised by a gender division of labour and gendered internal power relations.²¹ Peasants are extremely diverse and can belong to many different social classes and ethnic groups, as well as farming systems, around the world.²²

Chayanov was the first author to explain that peasantries meet their subsistence needs through the balance between the level of satisfaction of family needs and the level of hardness of work. In fact, peasant farming has a different economic logic from either capitalism or socialism, as maximising profit is not the main aim.²³ An activist definition, such as that developed by La Via Campesina, characterises peasantries as “people of the land”, having a

19 Ika Darnhofer, Strategies of family farms to strengthen their resilience, in: *Environmental Policy and Governance* 20/4 (2010), 212–222.

20 Teodor Shanin, The nature and logic of the peasant economy 1: A generalisation, in: *Journal of Peasant Studies* 1/1 (1973), 63–80, 63–64.

21 Carmen Diana Deere, What Difference Does Gender Make? Rethinking Peasant Studies, in: *Feminist Economics* 1/1 (1995), 53–72.

22 Marc Edelman, What is a peasant? What are peasantries? A briefing paper on issues of definition. Prepared for the first session of the Intergovernmental Working Group on a United Nations Declaration on the Rights of Peasants and Other People Working in Rural Areas, Geneva 2013, 15–19.

23 Alexandre Chayanov, *The theory of peasant economy*, ed. by B. Kerblay/R.E.F. Smith/D. Thorner, Homewood, IL 1966.

direct and special relationship with the land and nature through the production of food and/or other agricultural products on a small scale.²⁴ This definition implies that being a peasant is an act of resistance against the globalisation and industrialisation of food production and distribution.²⁵ Similarly, Van der Ploeg characterised peasantries by their struggle for autonomy, arising from a reaction to excessive dependence on agribusiness. Inventiveness, the ability to value and arrange the environmental and social resources at their disposal, and the ability to reconfigure the market are the strengths of peasantry in facing agribusiness.²⁶

We apply the concept of social capital to analyse the social ties within the value chain. Here we will use the definition given by Woolcock and Narayan, who define social capital as “the set of norms and networks that facilitate collective action”.²⁷ Social capital corresponds to a synergy between a normative and a structural dimension, which depend one on another.²⁸ The first dimension is related to the norms and values (e.g. trust) that govern interactions between agents. The second determines social capital by its structural characteristics, that is the formal framework within which the relations between the agents are established. This dimension relates to the configuration of networks (e.g. their density and hierarchy) and relies on recognised roles of individuals.²⁹ Social capital assists the flow of information by sharing experiences and know-how; it also allows reflections and communication between actors in order to make smarter decisions.

Forms of social capital can be distinguished according to the density of social ties, which corresponds to the combination of the amount of time, emotional intensity, intimacy, and reciprocal services between actors. Thus, different types of social capital have been defined according to the configuration of their ties.³⁰ First, bonding social capital connects individuals within the same community, actors belonging to the same group – relations within the family and to close friends as well as within communities. Bonding links are strong ties,³¹ they need to be constantly reactivated to make the social capital a useful resource.³² Second, bridging social capital consists of relationships where the actors are distant from each other. The latter notion refers to both their physical distance and the discontinuity in the activation of the link. Finally, linking ties characterise interactions between actors belonging to different groups. These links are vertical in nature. In this type of relationship, actors have different status or belong to different organisational levels. Linking and bridging ties are considered “weak”, connecting more distant individuals, who occupy different places or statuses and are dissimilar in a demonstrable fashion (i.e. age, education).³³

24 La Via Campesina, Declaration of Rights of Peasants – Women and Men, 2009, <https://viacampesina.org/en/declaration-of-rights-of-peasants-women-and-men/> (last visit in Oct. 2019)

25 Cf. Jan Douwe Van der Ploeg, *The new peasantries: struggles for autonomy and sustainability in an era of Empire and Globalization*, London 2008.

26 *Ibid.*, 17–18, 49–50.

27 Woolcock/Narayan, *Social capital*, 226.

28 Robert Putnam, *The prosperous community*, in: *The American Prospect* 4/13 (1993), 35–42.

29 Emmanuel Lazega, *Réseaux sociaux et structures relationnelles. Que sais-je?*, Paris 2014, 38–73.

30 Michael Woolcock, *Social capital and economic development: Toward a theoretical synthesis and policy framework*, in: *Theory and Society* 27/2 (1998), 151–208.

31 Granovetter, *Strength*.

32 Valérie Angeon/Jean-Marc Callois, *Fondements théoriques du développement local: quels apports du capital social et de l'économie de proximité?*, in: *Économie et Institutions* 6/7 (2005), 19–50.

33 Granovetter, *Strength*, 202–204.

Bridging and linking social capital (with weak ties) allows developing new ideas and values, facilitates information flows, and is indispensable to individuals' opportunities for integration into communities.³⁴ In contrast, bonding social capital (with strong ties) has a psychological role: it brings local cohesion but can lead to overall fragmentation and lock-in situations; a one-sided focus on being embedded in communities with a concentration on bonding social capital may weaken the ability to innovate.³⁵ Woolcock frames social capital with the notions of "embeddedness" and "autonomy".³⁶ We can understand bonding and bridging social capital on an individual level as providing embeddedness and autonomy respectively. On a collective level, we could understand tradition as providing embeddedness (bonding) and innovation as a result of autonomy (bridging). However, only the simultaneous presence and balance of embeddedness and autonomy, also in the sense of tradition and innovation, leads to progressive development and resilient communities.

The strength of a tie can be measured by the frequency and duration of contact, with strong ties assumed to be more frequent and longer ones. Social homogeneity is also an interesting indicator to define the strength of ties, in that strong ties connect socially homogeneous individuals while weak ties cross social distances and differences in occupational status.³⁷ In conclusion, social capital, in particular the strength of ties between actors, appears to be a relevant concept for analysing the resilience of traditional food value chains, especially the capacity to reconcile the maintenance of traditions with the development of territorial innovations. In this contribution, we apply the concept of social capital in a qualitative way. We do not aspire to measure the frequency, duration, or homogeneity of relations with numerical values, but rather analyse the functional consequences of weak and strong ties for maintaining tradition and introducing innovation.

What is the meaning of traditions in traditional food value chains?

Practices of extensive animal husbandry in mountain areas are adapted to the constraints of a harsh environment. For example, transhumance is a usual practice to benefit from the availability of forage at different altitudes and in different seasons (summer and winter pasture). These practices, considered traditional, include specific know-how transmitted from generation to generation. Tradition also refers to collectivity as a way of organising collective memory.³⁸ Raffestin and Bresso define tradition as "a repetition of similar operations, where the experiences are memorised, accumulated and then transmitted".³⁹ Tradition is something self-evident and allows acting within determined limits, without distinguishing between

34 Michael Woolcock, The place of social capital in understanding social and economic outcomes, in: *Canadian Journal of Policy Research* 2/1 (2001), 11–17.

35 James Coleman, Social capital in the formation of human capital, in: *American Journal of Sociology* 94 (1988), 95–120, 101–118.

36 Woolcock, Social capital, 162.

37 Peter Marsden/Karen Campbell, Measuring tie strength, in: *Social Forces* 63/2 (1984), 482–501.

38 Anthony Giddens, A vida em uma sociedade pós-tradicional, in: Anthony Giddens et al. (eds.), *Modernização reflexiva: política, tradição, estética na ordem social moderna*, São Paulo 1997, 73–133.

39 Claude Raffestin/Mercedes Bresso, Tradition, modernité, territorialité, in: *Cahiers de géographie du Québec* 26/68 (1982), 185–198, 187.

knowledge and practices. The aspects that characterise tradition include rituals, understood as part of the social structures that give integrity to traditions.⁴⁰ Time is an important factor, but not the main or only determinant, since a practice does not need to be old to be defined as traditional. It must have a dimension of involvement with the past and one of persistence in the present. In traditional cheese value chains, the cheeses studied are traditional not only because they have been produced for more than 200 years, but because they are connected to knowledge and practices that, for some reason, make sense for the actors involved and in their view deserve to be preserved. For tradition to be alive, it must be significant in the present,⁴¹ and it is not only the product itself that has to be preserved (for example a cheese), but an entire set of representations, symbols, and identities, created and recreated from it. Tradition provides no means of dealing with unforeseen situations; new practices are developed, but they take the form of incremental adaptations over the long term. Tradition evolves over time and is permanently under reconstruction by its “guardians” (in our case, cheese makers). These “guardians” have the legitimacy to interpret traditional practices,⁴² for example, to alter the production process, to develop new packaging, or to experiment with new ways of working together. In other words, tradition is not the opposite of modernisation. Innovation appears as a key element in traditional value chains, because it allows a constant adaptation to maintain the resilience of such territories.⁴³

Innovation processes at the heart of the resilience of traditional food value chains

Territorial innovations, defined as a new response to a problem or a need identified collectively in a territory, with a view to improving well-being and sustainable local development,⁴⁴ are central elements for maintaining the resilience of territories and their processes depend largely on territorial governance. Territorial innovations involve not only technological innovation, which generally dominates national policy, but are more complex processes that include other forms of innovation, organisational, social, and institutional, related to governance and based on social and cultural foundations.⁴⁵ In this way, innovation processes most often do not correspond to a linear model in which innovation is developed by scientists and taken up by practitioners. Rather, they appear to unfold independently of new scientific knowledge or simultaneously with it, with other forms of knowledge such as tacit knowledge or social capital coming into play, and with learning processes occurring in local social networks.⁴⁶ Organisational innovation is central in the sense that it provides favourable condi-

40 Giddens, *A vida*, 83.

41 Cf. Fabiana Thomé da Cruz, *Produtores, consumidores e valorização de produtos tradicionais: um estudo sobre qualidade de alimentos a partir do caso do queijo serrano dos Campos de Cima da Serra-RS*, PhD thesis in Rural Development (Programa de Pós-Graduação em Desenvolvimento Rural, Faculdade de Ciências Econômicas, Universidade de Federal do Rio Grande do Sul), Porto Alegre 2012.

42 Giddens, *A vida*, 96.

43 Torre/Vollet, *Aux fondements*.

44 Oural, *L'innovation*, 7.

45 Torre/Vollet, *Aux fondements*, 19.

46 Lorna Dargan/Mark Shucksmith, *Leader and innovation*, in: *Sociologia Ruralis* 48/3 (2008), 274–291.

tions for collective organisation and for further innovations.⁴⁷ Indeed, territorial innovation comes from the creative energy of local actors sharing the same mental representations.⁴⁸ Mountain areas, often characterised as peripheral regions with many physical constraints, instead appear as unexplored niches with their own potential for innovation, where the territory is the place of transformations and innovations with a collective and organisational dimension.⁴⁹

Local actors in these territories contribute to the creation and also to the acceptance of innovation. The diffusion of innovations occurs in the territory when their appropriation and learning are successful among the actors. Nonetheless, political orientations defined at higher levels (i.e. regional or national) appear instrumental in favouring or impeding the emergence and diffusion of innovation at the local level.⁵⁰ Territorial innovations enable the transformation of generic resources into territory-specific resources, allowing an escape from competition with standardised products, in effect creating a “distinguishing advantage”.⁵¹ Eventually, innovations can lead to important modifications of the initial model.⁵²

Methods

In considering the Serrano cheese value chain, the concept of social capital will be used to understand how territorial innovations emerge and develop over time, and also how traditions are maintained, pointing out the role of central actors in these processes.

The information needed was first collected through semi-structured interviews with local actors during three sessions of fieldwork. The first fieldwork was carried out in February 2017, the second session in August and September 2017, and the third in March 2018. A total of 67 producers were interviewed about the technical aspects of production and commercialisation, as well as the historical and social aspects of the value chain. More precisely, we asked about their level of involvement in associations (i.e. position in the association, frequency of participation in monthly meetings), their qualitative assessment of trust relations and the frequency of meetings with other actors of the value chain, and the evolution of the production systems and means of commercialisation since the beginning of their activity.

Agricultural advisors (EMATER-RS⁵³ in Rio Grande do Sul and EPAGRI-SC⁵⁴ in Santa Catarina), veterinarians, and municipal functionaries of agriculture in eight different municipalities in the Campos de Cima da Serra region were also interviewed. These interviews inquired as to the organisation of the value chains, its evolution over time since the 1950s (the

47 Andréa Finger-Stich, L'innovation au pluriel des cré-acteurs alpins, in: *Journal of Alpine Research* 97/1 (2009), 66–75, <https://journals.openedition.org/rga/809> (last visited 22 Oct. 2019), DOI: 10.4000/rga.809.

48 Torre/Vollet, *Aux fondements*.

49 Jean Corneloup, Comment est abordée la question de l'innovation dans les sciences sociales?, in: *Journal of Alpine Research* 97/1 (2009), 113–128, <https://journals.openedition.org/rga/828> (last visited 22 Oct. 2019), DOI: 10.4000/rga.828.

50 Torre/Vollet, *Aux fondements*.

51 Corneloup, *Comment est abordée*, 116.

52 Torre/Vollet, *Aux fondements*.

53 Brazilian Company of Technical Assistance and Extension Rural in the Rio Grande do Sul state, created in 1955.

54 Company of Agricultural Research and Rural Extension of Santa Catarina, created in 1956.

beginning of technical innovation diffusion by the advisory services), and current conflicts between actors of the value chain. We also asked these actors to describe their activities, the frequency of their visits to the farms, and to assess the quality of their relationships with the producers (i.e. trust). Finally, one interview was conducted at the head office of EMATER-RS in Porto Alegre and two at the regional office of EPAGRI-SC in Lages to gain insights about the value chain organisation from the regional and state perspective. We also interviewed a deputy of the Rio Grande do Sul state assembly involved in supporting the artisanal Serrano cheese value chain to ask about the actions taken at the state and federal levels for the legalisation and recognition of the cheese.

Then, semi-structured historical interviews (“farm biographies”) were conducted with two families of producers. They provided important details about the history of their properties since the nineteenth century and of the evolution in production systems and the organisation of the value chain over time, as well as the development of other activities in the region.

Additionally, historical and scientific literature, such as narratives, master and PhD theses written about the region and the artisanal Serrano cheese value chain were consulted.⁵⁵

The artisanal Serrano cheese value chain today

Localisation

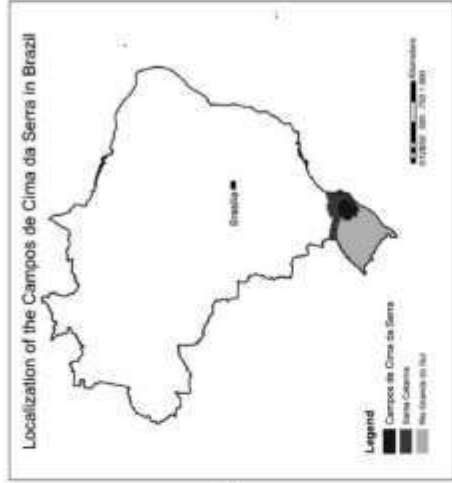
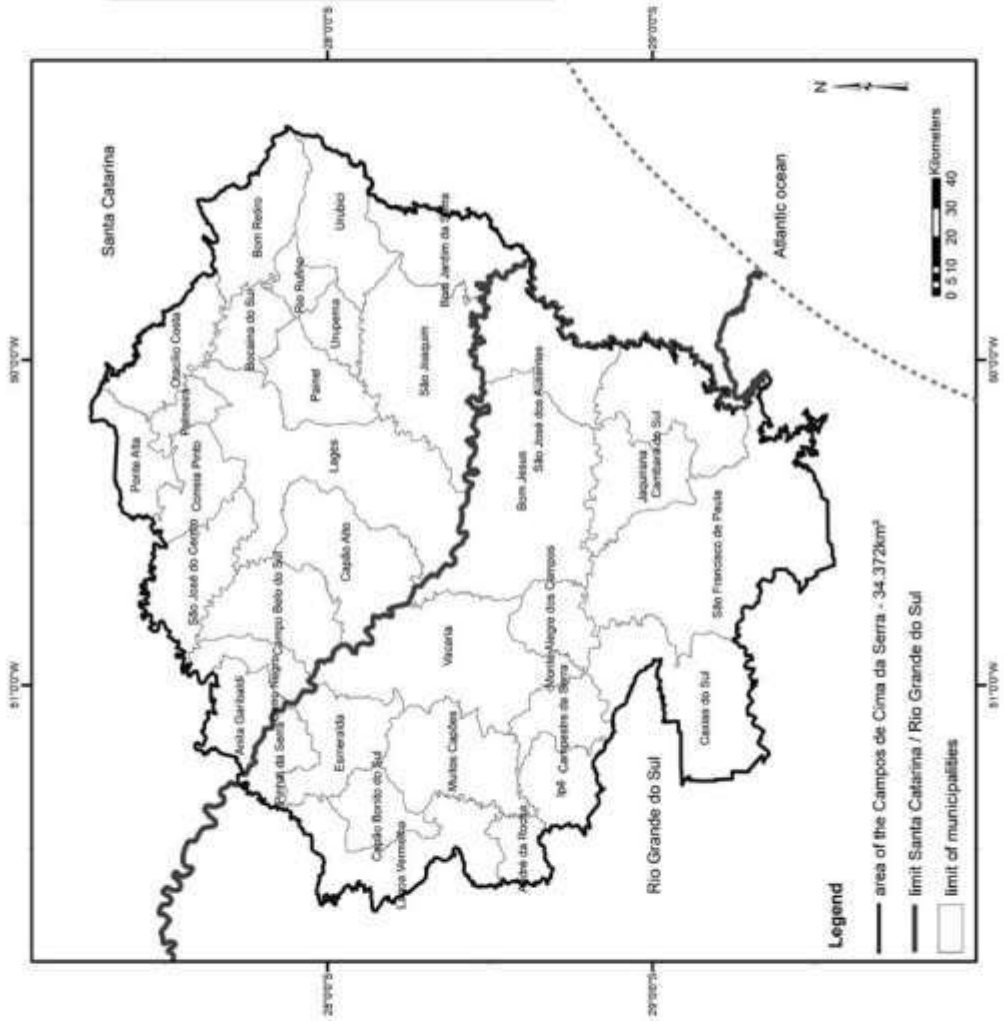
The artisanal Serrano cheese is a traditional raw milk cheese, produced as a by-product of beef cattle farming in the Campos de Cima da Serra in the states of Rio Grande do Sul and Santa Catarina. The Campos de Cima da Serra region is mountainous, with 77 percent of the area at altitudes between 700 and 1,100 metres, the highest peak reaching 1,822 metres. The region is located at the transition between the Atlantic Forest and the Pampas biome. The climate is temperate, with average temperatures between 8° Celsius in winter, with some frost and snowfalls, and 19° Celsius in summer. Average precipitation is 1,500 to 2,000 millimetres, spread across the year. The ecosystem is made up of plateaus of natural pastures, where the species *Andropogon lateralis* and *Schizachirium tenerum* dominate, and isolated stands of araucaria forests (*Araucaria angustifolia*). The soils are shallow, with rocky outcrops. Fertility is low and comes from the decomposition of volcanic rock. The relief is wavy and the eastern side of the region is characterised by the presence of canyons.⁵⁶

Fifteen municipalities in the federal state of Rio Grande do Sul and eighteen in that of Santa Catarina produce artisanal Serrano cheese, together making up the Campos de Cima da Serra region (Figure 1). Population density is low, with an average of 10.2 inhabitants per square kilometre (compared to overall averages of 38.0 for Rio Grande do Sul and 65.3 for

55 Fidelis Dalcin Barbosa, *História do Rio Grande do Sul*, Porto Alegre 1976; Moacir Flores, *História do Rio Grande do Sul*, Porto Alegre 2003; Krone, *Identidade e cultura*; Cruz, *Produtores*; Lucila Maria Sgarbi Santos et al. (eds.), *Raízes de Bom Jesus e São José dos Ausentes*, XXIV Encontro dos Municípios originários de Santo Antônio de Patrulha, Companhia Rio-Grandense de Artes Gráficas (CORAG), Porto Alegre 2016.

56 Francisco Vieira/Denilson Dortzbach, *Caracterização ambiental e delimitação geográfica dos Campos de Cima da Serra*, Florianópolis 2017, 13.

Figure 1: Localisation of the municipalities producing artisanal Serrano cheese



coordinate system: GCS_South_American_1969
 source: IBGE
 cartography: C. Pachoud

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), cartography by Carine Pachoud.

Santa Catarina).⁵⁷ Today around 460,000 people live in the region; the two biggest cities are Lages/SC, with 158,500 inhabitants, and Vacaria/RS, with 65,400 inhabitants. Thus, 2.6 percent of the population live in 8.9 percent of the total territory of the two states. The Human Development Index is lower on average than for either of the two states overall, at 0.694 in the Campos de Cima da Serra region, compared to 0.746 in Rio Grande do Sul and 0.774 in Santa Catarina.⁵⁸ This region is isolated, with low infrastructure development (transport axis, information and communication technologies).⁵⁹

Production systems

Livestock farming is the prime economic activity in the region.⁶⁰ More than 90 percent of its farms are small-scale, family-owned cattle-breeding systems. A total of 3,000 families produce artisanal Serrano cheese and for most of them this is the principal economic activity, providing more than 50 percent of revenue.⁶¹ The most common production system is an extensive mixed dairy-beef livestock system, with dairy and beef cattle simultaneously on the same farm. The breeds are mainly European ones, such as Hereford, Devon, Charolais, Jersey, and Holstein cows, though some are local, like Girolanda or Franqueiro. Only a few cows in any herd are milked for cheese production, with the others left to provide milk for the calves. They are milked once a day and the women generally take over the processing of milk into cheese. Milk productivity is low – the average yield of a cow is 8.0 litres per day, compared to 19.3 litres for specialised dairy farms in the EU-15.⁶² The herds graze on the natural pastures all year round, supplemented by temporary grazing on managed pastures of oats and ryegrass. In winter, to supplement the shortage of natural forage, a concentrate feeding of soya or maize silage is given especially to the lactating cows. Ambrosini identified six different production systems, all of them peasant farming systems. Five of these are considered traditional breeding systems (mixed dairy-beef systems), the distinctive factors being the presence or absence of breeding and/or fattening calves and the presence or absence of commercial crops on the property. Only one system has been identified as an intensive dairy system, which means that there is a separation between dairy and beef breeds, no fattening

57 Atlas Socioeconômico Rio Grande do Sul, Índice de Desenvolvimento Humano – IDH e IDHM, <https://atlas-socioeconomico.rs.gov.br/indice-de-desenvolvimento-humano-idh-e-idhm> (last visited 26 Jun. 2018).

58 Instituto Brasileiro de Geografia e Estatística, Estimativas da População, <https://www.ibge.gov.br/estatisticas-novoportal/sociais/populacao/9103-estimativas-de-populacao.html?=&t=o-que-e> (last visited 26 Jun. 2018).

59 Larissa Ambrosini, Sistema agroalimentar do Queijo Serrano: estratégia de reprodução social dos pecuaristas familiares dos Campos de Cima da Serra – RS, Master thesis in Rural Development (Programa de Pós-Graduação em Desenvolvimento Rural, Universidade Federal do Rio Grande do Sul), Porto Alegre 2007.

60 Evander Eloí Krone/Renata Menasche, A formação da pecuária de corte e da produção tradicional do Queijo Serrano dos Campos de Cima da Serra, in: Paulo Waquil et al. (eds.), Pecuária familiar no Rio Grande do Sul: história, diversidade social e dinâmicas de desenvolvimento, Porto Alegre 2016, 169–184.

61 Jaime Eduardo Ries et al., Aprocâmpos – uma experiência de sucesso na qualificação e valorização do queijo artesanal Serrano, Emater-RS 2014, 50–62, 54.

62 Marie-Laure Augère-Granier (European Parliamentary Research Service), The EU dairy sector. Main features, challenges and prospects, [http://www.europarl.europa.eu/RegData/etudes/BRIE/2018/630345/EPRS_BRI\(2018\)630345_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2018/630345/EPRS_BRI(2018)630345_EN.pdf) (last visited 15 Jun. 2019).

of the calves, and cows are milked twice a day. However, this intensive system represents only 3 percent of the farms producing artisanal Serrano cheese. The six farming systems are:

- 1) Raising calves with feed produced on the farm (corn, soya, and managed pasture)
- 2) Raising, reproduction, and fattening of cattle with feed produced on the farm
- 3) Raising calves with feed produced on the farm for their own herd and for commercialisation (corn, soya, beans)
- 4) Raising and reproduction of cattle with feed produced on the farm for their own herd and for commercialisation
- 5) Raising, reproduction, and fattening of cattle with feed produced on the farm for their own herd and for commercialisation
- 6) Dairy system without raising of calves⁶³

Table 1 presents the size and production of 67 family farms producing artisanal Serrano cheese in the Campos de Cima da Serra region. The data was gathered in February 2017, August/September 2017, and March 2018.

Table 1: Production and size of properties producing artisanal Serrano cheese

	Average	Minimum	Maximum
Number of cattle	90,6	14,0	800,0
Number of cows milked	14,4	3,0	40,0
Milk production (L milk/cow/day)	8,0	2,0	20,0
Cheese production (kg cheese/day)	10,5	2,0	70,0
Total area (ha)	132,2	6,5	980,0
Area of natural pastures (ha)	96,7	3,0	90,0
Area of managed pastures (ha)	17,5	2,0	70,0

Source: Own calculation.

Agricultural advisory services

Agricultural advisory services form an important resource for these production systems. As the case study region spans two federal states, two different institutions are present to fulfil this function. EPAGRI-SC is the public Company for Agricultural Research and Rural Extension of Santa Catarina. It is connected to the office of the Secretary of State for Agriculture and Fisheries and was created in 1991. However, advisory services had already existed in the state since 1956. There are two regional offices located in Lages and São Joaquim, and every municipality has its own local office. At the regional scale, one advisor coordinates a group of eighteen advisors (one in each municipality) working especially on the artisanal Serrano cheese value chain.

63 Ambrosini, Sistema agroalimentar, 95–124.

EMATER-RS is the Company of Technical Assistance and Rural Extension in the Rio Grande do Sul state, created in 1955. This institution is private and has no agreements with the federal Ministry of Agriculture, Livestock, and Supply (MAPA) to implement joint projects with EPAGRI-SC. There is one regional office in Caxias do Sul and one state office in Porto Alegre. All municipalities have their own office with one or several advisors working directly with the producers. At EMATER-RS, there is no group dedicated to the Serrano cheese value chain. The advisors are expected to deal with all activities in which the service is involved and all kinds of productions.

Legal situation

The Brazilian legal framework does not permit the selling of raw milk cheese with less than sixty days of maturation since law no. 1,283⁶⁴ came into force in 1952 through regulation no. 30,691.⁶⁵ Most Serrano cheese makers do not respect this restriction because consumers prefer young cheese to matured cheese. They therefore sell their produce within less than thirty days, which makes the sales illegal.

Moreover, the sanitary norms for dairy products in Brazil do not consider the specificities of artisanal production, but subject them to the same sanitary standards and require the same facilities as for big dairy industries, making it impossible for small-scale farmers to comply because of the high costs of adaptation. Furthermore, producers claim that the high standards have a negative impact on artisanal characteristics of the cheese, for example, by requiring them to replace wooden moulds with plastic ones. The producers feel marginalised and the informality of production and the illegality of sales leads to greater health risks for the consumers in the long run, as there is no sanitary control.⁶⁶

In Brazil, regulatory systems exist at different levels: municipal, state, and federal, each with their own control bodies. The Municipal Inspection Service (SIM) establishes and controls the sanitary norms for production and sale of artisanal Serrano cheese, but only for mature cheese, ripened for more than 60 days. This is a precondition for selling the cheese, but only within the area of the municipality. The veterinarians employed by the municipal prefectures in principle inspect the health of herds and the adequacy of infrastructure, supported by EMATER-RS and EPAGRI-SC. However, take-up by the producers is low. The main difficulties for small producers are the high costs of complying with the rules, without credit facilities or subsidies, and the cost of the annual inspection of the herd for control and eradication of brucellosis and tuberculosis (a national program of the MAPA). This includes the vaccination of female calves three to eight months old against brucellosis, testing for brucellosis and tuberculosis, as well as inspection of the chemical and microbiological quality of the water and of the microbiological quality of the cheese once a year. Moreover, most of the milk processing facilities are very far from the required norms and the lack of prospects

64 Presidency of the Republic of Brazil, Lei nº 1.283, 18 Dec. 1950, Dispõe sobre inspeção industrial e sanitária dos produtos de origem animal, Presidência da República, Casa Civil, Brasília.

65 Presidency of the Republic of Brazil, Decreto nº 30.691, 29 March 1952, Aprova o novo Regulamento da Inspeção Industrial e Sanitária de Produtos de Origem Animal, Presidência da República, Casa Civil, Brasília.

66 Cruz, Produtores, 33.

for passing the farm on to the next generation makes the producers reluctant to invest in new equipment. However, requirements can vary between the different SIMs because there is no standardisation of the norms between the municipalities; for example, only some SIMs mandate attending a course on cheese production. In Santa Catarina, an Intermunicipal Consortium (CISAMA) exists between the eighteen municipalities producing artisanal Serrano cheese, which allows uniform requirements by the different SIMs. However, given the lack of market within the municipalities, most producers sell outside them, and thus the SIM certification seems useless to them. Thus, relations of proximity and trust between producers and consumers seem to be more important than standardisation.⁶⁷

At the state level, in Rio Grande do Sul a law authorising the sale of cheese throughout the state was signed in 2016 (law no. 14,973)⁶⁸ and the decree was approved in August 2018 (decree no. 54,199).⁶⁹ In Santa Catarina a law was signed in September 2016 (law no. 17,003/2016)⁷⁰ and the decree in July 2017 (decree no. 1,238/2017),⁷¹ but until today no producer has acquired the state legalisation. To date, there is no regulation at the federal level to authorise the marketing of artisanal Serrano cheese throughout Brazil as a whole. These two levels apply stricter norms than the municipal level, which would make it more difficult for the producer to legalise commercialisation of cheese at the state or federal level. However, the SIM can confer the SUSAF⁷² or the SISBI-POA⁷³ label, which correspond to the equivalent state and federal certification, if they have authorisation from the state or the federal authorities after an inspection of the SIM.⁷⁴ Currently, only the SIM of São Francisco de Paula/RS is authorised to award the SUSAF label and only one producer obtained this certification in 2017. No producer has the SISBI-POA label, because no municipality has yet received authorisation to award it. In Santa Catarina, CISAMA has been authorised by state and federal inspection services to confer the SUSAF and SISBI-POA labels on dairies which

67 Jaqueline Sgarbi, *Dilemas e desafios na valorização de produtos alimentares tradicionais no Brasil: um estudo a partir do queijo do serro, em Minas Gerais, e do queijo serrano, no Rio Grande do Sul*, Pelotas 2014, 224.

68 State of Rio Grande do Sul, Lei nº 14.973, 30 Dec. 2016, Dispõe sobre a produção e a comercialização do queijo artesanal serrano no Estado do Rio Grande do Sul. Assembleia legislativa, Gabinete de Consultoria Legislativa, Porto Alegre.

69 State of Rio Grande do Sul, Decreto nº 54.199/2018, Dispõe sobre a produção e a comercialização do queijo artesanal serrano no Estado do Rio Grande do Sul, Assembleia legislativa, Porto Alegre.

70 State of Santa Catarina, Lei nº 17.003, 1 Sept. 2016 (Regulamentada pelo Decreto nº 1238/2017), Dispõe sobre a produção e a comercialização do queijo artesanal serrano, no Estado de Santa Catarina, Assembleia Legislativa, Florianópolis.

71 State of Santa Catarina, Decreto nº 1238/2017, Dispõe sobre a produção e a comercialização do queijo artesanal serrano, no Estado de Santa Catarina, Assembleia Legislativa, Florianópolis.

72 Unified Sanitary State System for Agroindustrial, Artisan and Small-Scale Production, regulated by state decree no. 49340 of 5 July 2012. The system guarantees the equivalence of the Municipal Inspection Services and Municipal Sanitary Vigilance, by municipality or by means of an intermunicipal consortium, for the production and commercialisation of animal and vegetable products of family agriculture and small-scale production throughout the state territory.

73 Brazilian System of Inspection of Animal Products, which is part of the Unified System of Attention to Agricultural Health (SUASA), standardises and harmonises procedures for inspection of animal products to ensure food safety. The states, the Federal District, and the municipalities can request the equivalence of their inspection services with the SISBI Coordinating Service. To obtain this, it is necessary to prove that they are able to assess the quality and safety of animal products with the same efficiency as the Ministry of Agriculture.

74 <http://www.agricultura.gov.br/assuntos/inspecao/produtos-animais/sisbi-1> (last visited 15 May 2018); <http://www.agricultura.rs.gov.br/susaf> (last visited 15 May 2018).

respect the standards required in all the municipalities of the producing region. The major problem is that complying with federal or state inspection services represents high costs for many municipalities – for example, a second veterinarian and a car are required to inspect the farms, a room is necessary to organise meetings, etc.

Organisation of the value chain

Due to this complexity of the legal framework, most artisanal Serrano cheese is sold locally in the region or in cities nearby (such as Porto Alegre, Caxias do Sul, or Criciúma), by direct sales to consumers or in small markets of the region. Consumers come to the farms to buy, or producers take the cheese to market, or occasionally intermediaries buy on the farms for resale in bigger cities,⁷⁵ sometimes in neighbouring regions. There are also new marketing strategies: for example, a trader from São Paulo comes to get cheese from a producer for resale in São Paulo at a higher price, and some people order cheeses by mail.⁷⁶

Historical analysis of the artisanal Serrano cheese value chain: a value chain in constant adaptation

1700–1950: introduction of cattle and development of Serrano cheese production

1700–1825: The settlement of the region and the beginning of Serrano cheese production

Until the end of the seventeenth century, the region was inhabited by indigenous people living by gathering, hunting, and fishing. They also began to cultivate corn and cassava using the slash-and-burn system, but there was still no animal husbandry. The introduction of livestock was the work of the Jesuits. They arrived in the region between 1702 and 1707; their objective was to convert the indigenous people to Catholicism. They decided to settle the area to protect the cattle in the *Vacaria⁷⁷ del Mar* from being stolen by cattle dealers, so-called *bandeirantes*, interested in the leather. The Jesuits explored the Campos de Cima da Serra and were attracted by the immensity of the natural pastures. Moreover, the canyons and rivers surrounding it served as natural fences for the animals and made access difficult for the cattle dealers.⁷⁸ The cattle were used for meat and leather in Jesuit reductions (settlements for indigenous people established by the Jesuits). In 1709 it was estimated that there were about 100,000 head of cattle.⁷⁹ In 1750 the region became Portuguese after the signing of the Treaty of Madrid to

75 Cruz, *Produtores*, 154.

76 Sgarbi, *Dilemas*, 141.

77 A *vacaria* was a big reserve for cattle formed by the missionary Jesuits.

78 Cruz, *Produtores*, 75.

79 Flores, *História*, 42.

Figure 2: Roads used for the mule and cattle trade in the seventeenth and eighteenth centuries



Source: João Carlos Paixão Côrtes, *Danças Birivas do Tropeirismo Gaúcho*, CORAG, Porto Alegre 2000, 52.

redefine the frontiers between the Spanish and the Portuguese crown. Fearing that the Jesuits, who were autonomous and very well organised, would form their own theocratic state, the marquis de Pombal expelled them in 1759. The indigenous people were decimated, and the Jesuit reductions fell into ruin, allowing wild animals to graze in the natural pastures.⁸⁰

From the end of the seventeenth century onwards, the discovery of gold mines in south-eastern Brazil led to a trade in mules from Argentina and southern Brazil, used to carry gold, and a trade in cattle to supply the lack of food in the mining region, where there were no agricultural activities. This form of trade was called *tropeirismo*.⁸¹ In 1727 and 1733, two roads were constructed through the Campos de Cima da Serra for the mule and cattle traders to pass through on their way to the mining region⁸² (Figure 2).

Some Portuguese, early immigrants to São Paulo or Laguna, were attracted by the wild cattle and vast pastures and decided to settle in the region. They were given large estates (*sesmarias*) with the intention of protecting the frontiers and developing agriculture. Land was granted especially to nobles, navigators, or soldiers to reward their services to the crown. One *sesmaria* usually measured around 13,000 hectares, but some families received up to ten *sesmarias*.⁸³ The new settlers started extensive livestock breeding. The workforce was composed of workers who herded the cattle and processed their milk into cheese, which had to be delivered to the landlord, most of it being given to the workers as salary. Cattle and leather were sold by the landlord of the *sesmaria* on the market. There were up to 30 families of workers per farm.⁸⁴ Slaves were probably only used for domestic tasks, agriculture, and construction.⁸⁵ Indeed, extensive livestock husbandry needs few workers, and the use of horses for the management of the cattle would have allowed the slaves to escape.

In this context the workers developed a system of subsistence farming, including the production of cheese.⁸⁶ The first record mentioning artisanal Serrano cheese dates from 1864, corresponding to the beginning of trade in it, but production may have begun with the installation of the first properties.⁸⁷ At that time the cheese, although the landlords kept a part of it for their own consumption, was mainly consumed by the workers. In fact, they used to produce cheese only in summer from the milk of lactating cows. In winter it was not possible to produce any because of a shortage of natural forage, which meant a reduced milk yield. A transhumance system was implemented to handle the shortage of forage during winter. The cattle were driven to the slopes along the rivers, where forests protected them from the cold and provided food. The cheese production during summer allowed the workers to conserve milk for consumption in winter.⁸⁸

80 Cruz, *Produtores*, 75.

81 Ivo Pacheco Velho, *Bom Jesus: primeiros tempos*, in: Sgarbi Santos et al. (eds.), *Raizes*, 93–99.

82 Barbosa, *História*, 32.

83 Luiz Antônio Alves, *São José dos Ausentes: o marco do povoamento português no Rio Grande do Sul*, in: Sgarbi Santos et al. (eds.), *Raizes*, 25–47, 30.

84 Krone/Menasche, *A formação*, 76.

85 Ambrosini, *Sistema agroalimentar*, 55.

86 Krone/Menasche, *A formação*, 180.

87 Moacir Daros, *A prova do Queijo Serrano*, in: Elusa Maria Silveira Rodrigues et al. (eds.), *Bom Jesus e o tropeirismo no Cone Sul*, Porto Alegre 2000, 369–373.

88 Ambrosini, *Sistema agroalimentar*, 84.

In conclusion, during the first century of Serrano cheese production, from the second quarter of the eighteenth century onward, the first farmsteads were established in the Campos de Cima da Serra through land grants to Portuguese people by the crown. However, the properties were isolated from each other and from cities; some owners used to live outside their property, in more populated areas on the coast, leaving the farm to be managed by the workers.⁸⁹ While cattle and leather were destined for the market, the cheese was produced by the workers for their own consumption and served no commercial purpose.

1825–1950: European immigration and the beginning of the artisanal Serrano cheese trade

The nineteenth century marked the end of the imports of cattle and mules to the mining region, because of the decline in gold production as the mines became depleted. However, starting in the first quarter of that century, with the arrival of European immigrants in Brazil, another kind of trade developed. First, Germans, who arrived from the second quarter of the nineteenth century onwards, established themselves in the region of Porto Alegre and Laguna, growing cassava, sugarcane, corn, beans, and tobacco, and producing flour, molasses, and cachaça. These products were exchanged for the artisanal Serrano cheese, pine nuts, and jerked beef produced in the Campos de Cima da Serra region. Groups of dealers riding mules went down the mountain to trade with the Germans. This form of trade was no longer called *tropeirismo*, but *tropeirismo regional*,⁹⁰ as trade became regional. From 1860, some Germans bought lands in the Campos de Cima da Serra, because they were attracted by the climate, similar to that in Germany. They began breeding cattle and intermarried with local people.

After 1875 Italians arrived and settled in cities, living as artisans, such as bricklayers or shoemakers, or as merchants. After the Second World War, as they became more prosperous, some bought land in the region like the German immigrants before them and began breeding cattle or married local people.⁹¹

The trade in artisanal Serrano cheese developed from the first quarter of the nineteenth century. Its value increased thanks to the growing demand with the arrival of new European immigrants. The *tropeiros regionais* were the only people trading cheese with other regions. During this period, the cheese was still matured longer than two months, as the *tropeiros regionais* needed several weeks to bring it from the Campos de Cima da Serra to the littoral and they did so only a few times a year. The production system remained the same, with cheese only produced in summer by workers and transhumance to the forest areas in winter.

In conclusion, these two periods of time are important for understanding the development of the artisanal Serrano cheese value chain. Initially, it was the presence of workers on the farms and also the market for beef and leather that allowed the beginning of its production. Then with the arrival of more Europeans, a new market for the cheese allowed the maintenance of its production and made partitions by heritage possible through the production of

89 Krone, *Identidade*, 30.

90 *Ibid.*, 38.

91 Krone/Menasche, *A formação*, 179–180; Nilza Huyer Ely, *A participação dos alemães na formação étnica, cultural e econômica dos Campos de Cima da Serra*, in: Sgarbi Santos et al. (eds.), *Raízes*, 274–299, 275–276.

cheese on smaller areas. Farms were isolated and there was little exchange between workers on different farms. Cheese was at first mainly produced for subsistence, later also for sale. In both cases it remained mature cheese, on account of the seasonal production combined with transhumance.

The two more recent periods (1950–2000 and 2000–today) will be presented in the next section through the lens of social capital. They correspond to the diffusion of technical innovations and the emergence of collective organisation within the value chain.

1950–2000: the development of peasant farming and the technical modernisation of artisanal Serrano cheese production

In the Campos de Cima da Serra region, inheritance customs always divided the land equally between the heirs, which led to fragmentation over time. With the decrease in the size of holdings, the former landlords gradually became farmers themselves. Moreover, with new regulations for employment contracts, the hired workforce declined and gradually vanished. We can understand the process as a sort of gradual “peasantisation” of the farmers, which was completed in the middle of the twentieth century. This social group was characterised by family units producing mainly for their basic needs on the farms and selling surplus beef and cheese on the market, with a strong identity guiding their way of life.⁹²

Things changed in the following era of modernisation during the 1950s. In 1952 law no. 1,283 came into force through regulation no. 30,691, which prohibited the marketing of raw milk cheese with less than sixty days of maturation. The regulation aimed at standardising production processes and hygiene and was designed under pressure from food industries, disregarding artisanal production.⁹³ Usually artisanal Serrano cheese is sold at between ten and 30 days of maturation because of new consumer preference; thus, the law made marketing it illegal.

At the same time, an important transition in the traditional agrarian system of extensive cattle and seasonal cheese production occurred in the 1960s and 1970s with the green revolution, called the “conservative modernisation” in Brazil. The green revolution was encouraged by the government to modernise agriculture by diffusing technical innovations to the farms. The inheritances that led to smaller properties facilitated this transition, as cheese became of greater importance for the family income, because dairy production usually utilises the area more intensively than extensive beef production systems.⁹⁴ Many properties no longer included both winter forest and summer pasture, but were located either in the pasture or in the forest zone. During that period, European beef breeds (such as Charolais or Hereford) and dairy breeds (such as Holstein or Jersey) replaced the creole cattle and almost led to the extinction of the original Franqueiro breed. These less rustic but more productive breeds

92 Cruz, *Produtores*, 72–73.

93 *Ibid.*, 159–163; Sgarbi, *Dilemas*, 141–143.

94 Carine Pachoud et al., Energy analysis of livestock systems. A comparison of different livestock systems in the Eastern Brazilian Amazon, in: *Journal of Agriculture and Environmental Sciences* 6/1 (2017), 30–37.

demanded a more nutritious diet. Pasture management was introduced with a mixture of oats and ryegrass to graze the herd in the winter during the shortage of natural forage. Such pastures required additional fertiliser and equipment for planting, ploughing, and fertilising. Moreover, the less robust European breeds required better veterinary services: vaccines, vermifuges, and the like.⁹⁵ These improvements allowed increasing the cheese production and made it possible to produce all year round without transhumance. From the 1990s, pastures of oat and ryegrass were planted in rotation with vegetables in summer. Indeed, in the early 1990s cultivation of potatoes started, first for seed production and later also for human consumption. Usually the new planters came from outside the region and rented the land from cattle breeders in the summer. Finally, the cultivation of vegetable crops such as broccoli and cabbage arrived in the early 2000s. All these activities led to a significant decline in natural pastures.⁹⁶

Finally, in the middle of the 1990s, tourism developed in the region, especially in the municipalities located close to the canyons, São José dos Ausentes and Cambará do Sul. Breeders themselves were developing infrastructure to host tourists. According to the tourism office of São José dos Ausentes, today there are 18 bed-and-breakfast operations on farms and Serrano cheese is a central ingredient on the menu. An average of 600 tourists visit the municipality per month, rising to up to 5,000 per month in winter. Cold, frost, and snow attract these tourists, the majority being Brazilians from the southeast of the country. The tourism sector is growing fast and expected to increase tenfold in the next 20 years.⁹⁷ Today rural tourism appears to be an important element to preserve the extensive breeding system and the production of artisanal Serrano cheese.

In conclusion, it was during this period that the peasant farming system evolved and the agricultural advisory services (EMATER-RS and EPAGRI-SC) were installed. This resulted in an important change in the traditional systems through technical innovations, initiated by the government during the Brazilian green revolution. Public research (Brazilian Agricultural Research Corporation, EMBRAPA) developed the innovations and the advisory services diffused them among the producers. This process did not involve organisational changes among local actors of the value chain as it was a process of individual diffusion of technical innovations. Moreover, it did not affect the methods of cheese production, even if it changed from seasonal to perennial. Producers and advisors were linked by weak ties, as meetings between these two types of actors, of different occupational status, occurred only during the visits of the advisors to the farms. Strong ties linked producers belonging to the same family, usually living on the same farm. In fact, in this period exchanges between families were infrequent, due to their geographical isolation.

95 Ambrosini, *Sistema agroalimentar*, 120–121.

96 *Ibid.*, 58.

97 Personal communication of the tourism secretary of São José dos Ausentes, 2017.

Since 2000: emergence of territorial innovations through the progressive involvement of the local actors for the defence and valorisation of artisanal Serrano cheese

At the beginning of the 2000s, the extensive livestock system, mixing beef and cheese production, was still the main activity in the region and accounted for 90 percent of the land use.⁹⁸ However, a change in consumer preference had appeared at the end of *Tropeirismo regional* from the middle of the twentieth century, as modern consumers preferred less matured cheese. This clashed with the legal framework and the control of raw milk cheese. Since 2001 health surveillance activities have been reinforced, with the right to control food products in municipalities (law no. 8,080/1990 and decree no. 2,665/2001).⁹⁹ Monitoring services impounded cheese without SIM certification or sold outside the municipality. A new federal environmental law prohibited removing any native species of the Atlantic Forest biome without authorisation, natural pasture included (law no. 11,428/2006¹⁰⁰ and decree no. 6,660/2008¹⁰¹). As a result, it has become impossible for producers to expand the cultivated pasture areas, often rented during summer for the cultivation of potatoes or vegetables such as broccoli. Thus, this law severely restricts income generation possibilities for peasant family farms.

In this new legislative context, different groups of producers have evolved. On the one hand, families who want to continue marketing cheese and/or to intensify their production are keen to legalise their cheese sales. On the other hand, families who do not want to comply with the current regulations either continue to sell illegally or have stopped producing Serrano cheese and now produce only beef or pasteurised cheese. Some families limit themselves to subsistence production.

To counter the threat of a decrease or extinction of artisanal Serrano cheese production, two mutually non-exclusive strategies have been implemented, largely supported by the agricultural advisory services, EMATER-RS and EPAGRI-SC (Table 2). The first strategy focuses on improving of the legal status of the cheese. The advisory services signed agreements with MAPA. The first one in 2008, between MAPA and EPAGRI-SC (with EMATER-RS participating informally due to its private status), aimed at implementing projects with the objectives of promoting the historical recovery of artisanal Serrano cheese, delimiting the producing region, registering and training producers, analysing physical, chemical, and microbiological characteristics, and describing production and manufacturing processes. This agreement led to regulation no. 214 issued by the State Secretariat for Agriculture, Livestock, Fisheries, and

98 Jaime Eduardo Ries/Luiz Gonzaga Messias, Campos de Cima da Serra: caracterização da região e do pecuarista familiar, EMATER/Porto Alegre 2003.

99 Julio César Corino, Avaliação da atuação da vigilância sanitária municipal de São Francisco de Paula referente ao queijo Serrano, Master thesis in administration, Universidade Federal do Rio Grande do Sul, São Francisco de Paula 2015, 25.

100 Presidency of the Republic of Brazil, Lei nº 11.428, 22 Dec. 2006, Dispõe sobre a utilização e proteção da vegetação nativa do Bioma Mata Atlântica, e dá outras providências, Presidência da República, Casa civil, Brasília.

101 Presidency of the Republic of Brazil, Decreto nº 6.660, 21 Nov. 2008. Dispõe sobre a utilização e proteção da vegetação nativa do Bioma Mata Atlântica, Presidência da República, Casa civil, Brasília.

Food Supply (SEAPPA) on 14 December 2010, which established the possibility of producing artisanal Serrano cheese, defined the characteristics, and delimited the producing region. A second agreement in 2013, again between MAPA and EPAGRI-SC (and EMATER-RS informally), aims to organise the value chain and to obtain the status of a protected designation of origin for cheese produced in the Campos de Cima da Serra. The request for this appellation was submitted to the National Institute of Industrial Property, which has the power to grant such certifications in Brazil, in August 2017.¹⁰²

The second strategy was directed towards improving the organisational capacity of producers and their supply chain. Some producers decided to associate, with support from the advisory services, to develop sustainable solutions. Local actors organised themselves to give more strength and visibility to the product and the region. The first Association of Serrano Cheese Producers of the Campos de Cima da Serra, Aprocampos, in the municipalities of São José dos Ausentes and Bom Jesus, was created in September 2010 with the support of the two local EMATER-RS offices. There are currently around fifty members. On the model of Aprocampos, Aprojaqui was founded in 2012 in the municipality of Jaquirana. In 2017 the municipality of Cambará do Sul decided to join the association, which currently has 26 families as members. Then in 2013, Aproserra was formed, grouping the eighteen cheese-producing municipalities in Santa Catarina state, on the initiative of EPAGRI-SC. Today, more than 70 families are members of the association. Lastly, Aprosãochico began in 2016 in the municipality of São Francisco de Paula; only six families producing artisanal Serrano cheese currently belong to it. A federation, Faproqas, was formed in 2017 to align these four associations. This allowed requesting the designation of origin, which would protect artisanal Serrano cheese and its typical quality by recognising the region and the know-how of production.¹⁰³

Many other activities have been undertaken since the associations were created. Aprocampos, as the oldest group, has been the leader of collective action:¹⁰⁴ In May 2013, the designation of immaterial cultural heritage was awarded by the National Historic and Artistic Heritage Institute to recognise and enable the development of policies to preserve the know-how of production. In December 2016, the law was approved, which legalises the production and marketing of artisanal Serrano cheese in the state of Rio Grande do Sul,¹⁰⁵ and the decree was approved in August 2018.¹⁰⁶ In the Santa Catarina state, the law was signed in September

102 John Wilkinson et al., *Indicações geográficas e produto de origem no Brasil: instituições e redes em ação recíproca*, in: John Wilkinson et al. (eds.), *O sabor da origem: produtos territorializados na nova dinâmica dos mercados alimentares*, Porto Alegre 2016, 73–106, 12–13.

103 Vieira/Dortzbach, *Caracterização*.

104 Ries et al., *Aprocampos*.

105 State of Rio Grande do Sul, *Lei nº 14.973, 30 Dec. 2016, Dispõe sobre a produção e a comercialização do queijo artesanal serrano no Estado do Rio Grande do Sul*, Assembleia legislativa, Gabinete de Consultoria Legislativa, Porto Alegre.

106 State of Rio Grande do Sul, *Decreto nº 54.199/2018, Dispõe sobre a produção e a comercialização do queijo artesanal serrano no Estado do Rio Grande do Sul*, Assembleia legislativa, Porto Alegre.

2016¹⁰⁷ and the decree in July 2017.¹⁰⁸ Over and above that, meetings are organised monthly to share information between the members and throughout the associations. Also, members can participate in courses offered by the agricultural advisory services to improve hygiene in milking and cheese making. As the standards of the SIM are not harmonised between municipalities, some require producers to attend the lecture on good practices of cheese making to obtain the SIM label. Lastly, through the associations, the state or private institutions such as banks give loans at low interest rates to families who want to build dairies on their farms. The Banco do Brasil Foundation offered 80 percent financial backing for the construction of nine dairies. Also, the state of Rio Grande do Sul provided financial support to fifteen families, members of the different associations, for the construction of small dairies and to the Aprocampos association to build its head office. In Santa Catarina, Aproserra received funds in 2016 from the state government's SC Rural program¹⁰⁹ to encourage the construction of 32 dairies, covering 50 percent of construction costs for each.¹¹⁰

Since the creation of the associations, producers, technicians, and researchers have become more and more active to promote artisanal Serrano cheese, at both the local and the federal level. Thus, in 2011 in Fortaleza/CE and in 2013 in Porto Alegre/RS, EMBRAPA and EMATER-RS organised the first two symposia on artisanal cheese in Brazil. The objective was to discuss topics related to the valorisation, quality, safety, and certification of Brazilian artisanal cheeses. At the regional level, interstate symposia on artisanal Serrano cheese have been held every two years since 2012 by EMATER-RS and EPAGRI-SC, involving all the municipalities producing the cheese. These events are an important space for discussion between producers, technicians, and public authorities on issues related to the production, regulation, and marketing of artisanal Serrano cheese at the national level. In addition, EMATER-RS and EPAGRI-SC regularly arrange Serrano cheese competitions at the local level, where all producers can participate, with or without certification. Moreover, various festivals are organised by the prefectures and the advisory services in different municipalities: for example, the Gila Festival and artisanal Serrano Cheese Festival are held every year in Bom Jesus.

Finally, a new project was started in 2018 by the Brazilian Service to Support Micro and Small Enterprises (SEBRAE) in partnership with the agricultural advisory services to improve marketing strategies for artisanal Serrano cheese, for example, to create better packaging.¹¹¹

These actions by the associations to produce better quality cheese and to promote its sale have already shown results. Indeed, today the average price of a kilogram of cheese is 20.40 *reais* (R\$); ten years ago it stood at R\$ 7.10, according to estimates in interviews with producers during the three field visits in 2017 and 2018. Fifty of the 67 producers interviewed also reported that demand has increased dramatically over the last ten years. One respondent even

107 State of Santa Catarina, Lei nº 17.003, 1 Sept. 2016 (Regulamentada pelo Decreto nº 1238/2017), Dispõe sobre a produção e a comercialização do queijo artesanal serrano, no Estado de Santa Catarina, Assembleia Legislativa, Florianópolis.

108 State of Santa Catarina, Decreto nº 1238/2017, Dispõe sobre a produção e a comercialização do queijo artesanal serrano, no Estado de Santa Catarina, Assembleia Legislativa, Florianópolis.

109 The Rural SC program is an initiative of the state government with financing from the World Bank (Bird) to increase the competitiveness of family agriculture in Santa Catarina.

110 Interview conducted with an extension agent of EPAGRI-SC, Lages, 14 Mar. 2018.

111 Interview conducted with an extension agent of EMATER-RS, São José dos Ausentes, 6 Mar. 2018.

said, “Sometimes we don’t have enough cheese to meet the demand”.¹¹² However, these actions depend mainly on the efforts of the advisory services. Today, in the Campos de Cima da Serra region, eighteen families have the SIM certification (twelve in Rio Grande do Sul and six in Santa Catarina), while only one has state certification through the SUSAF label. Many others will soon have their cheese sales legalised: more than fifteen families of producers are in the process of certification with the SIM in Rio Grande do Sul state and 24 in Santa Catarina. However, the large majority of producers do not want to legalise, for two main reasons: first, because of the high costs of complying with the standards, and second, because they do not agree with these new standards. According to these producers, standardisation would change the traditional characteristics of the Serrano cheese.

Table 2: Overview of the two strategies implemented from the 2000s to face the threat of decrease or extinction of artisanal Serrano cheese production

Improvement of the legal status of the Serrano cheese	Improvement of the organisational capacity of producers and their supply chain
<ul style="list-style-type: none"> • SEAPPA regulation no. 214/2010 establishing the possibility of producing Serrano cheese, defining its characteristics and delimiting the producing region • Request for a protected designation of origin in 2017 	<ul style="list-style-type: none"> • Creation of four producers’ associations that allowed obtaining or developing: <ul style="list-style-type: none"> ✓ the designation of immaterial cultural heritage ✓ state laws for the legalisation of the production and the marketing of the cheese ✓ meeting and courses ✓ loans for building dairies ✓ promotional activities • Creation of a federation of the associations which allowed requesting the designation of origin

Source: Own evaluation.

Starting in the 2000s, new organisational and institutional arrangements allowed reinforcing existing links or creating new ones between the actors of the value chain. Thus, advisors and producers are still linked by weak ties. Nonetheless, increasing numbers of opportunities for contact (such as association meetings or courses) improve the level of trust between them. Also, these new arrangements involve additional local actors in the value chain, such as the inspecting veterinarians and municipal functionaries of agriculture, offering opportunities to create new weak ties with the producers. However, producers have demonstrated a lack of trust in these functionaries, which limits interactions. Strong ties link producers belonging to the same family, as was the case during the previous period (1950–2000). Nonetheless, association meetings, courses, or other new opportunities for encounters bring together producers from different families and communities. This reinforces the social capital between the different families and builds up weak ties. With time, it may form a dense group and generate bonding social capital.

¹¹² Interview conducted with a producer, Bom Jesus, 15 Sept. 2017.

Discussion: from technical to territorial innovations – the role of social capital

The period between the beginning of the eighteenth and the middle of the twentieth century saw the development of cheese production and trade in the Campos de Cima da Serra region. At first, from the eighteenth to the nineteenth century, there was a capitalist system with large properties owned by landlords and most farm work done by families of workers living on the farms. The objective of the landlords was to produce leather and beef for the market, while cheese was made mainly for the consumption of the workers; it was produced in summer and could be conserved and consumed all year long. Then, from the nineteenth century until the 1950s, the cheese began to be exchanged for commodities from other regions, thanks to a new market created by the arrival of European migrants in neighbouring regions. It served as a surplus market good in combination with a strong subsistence orientation and helped to sustain the farming economy even when farm sizes were shrinking as a result of inheritance rules. These two periods are important to understanding how the cheese production developed and was maintained over the centuries.

About sixty years ago, this process of “peasantisation” was completed, due to repeated partitions of holdings between heirs and the nearly complete disappearance of non-family workforce because of the reduction in the size of farms. Until then the social unit was the farm, with little economic exchange and virtually no collective economic activity having developed between farms. We only analyse the social capital within the value chain and the emergence of territorial innovations from that period onwards.

The traditional farming system in the Campos de Cima da Serra region has evolved considerably since the development of the peasant system from the 1950s to adapt to changes. First, from the 1950s to 2000, farms have constantly maintained and increased their resilience by implementing new practices. Nonetheless, technical innovations have been the dominant form of innovations in the artisanal Serrano cheese value chain until the last decade. Most of these were introduced top-down during the green revolution by the advisory services, initially to increase production, but later also to adapt to standards of legalisation following changed consumer preferences. Producers and advisors were linked by weak bridging ties. Meetings between both occurred only during the visits by advisors to the farms. All these innovations and adaptations were made at the level of individual farms and did not involve collective action.

Second, from the 2000s to today a transformation has affected the original network, once characterised by few relations between local actors, through an organisational innovation involving the creation of associations and other collective actions. This can be understood as the beginning of a territorial innovation. Nonetheless, this collective organisation is recent and still faces many problems. The foremost of these is the low involvement of producers and the lack of a culture of cooperation. Few producers have joined associations and not many of the members participate in the monthly meetings. Producers take on few responsibilities and have little autonomy in making decisions for the collective.¹¹³ The agricultural advisory

113 Information was obtained from the interviews with extension agents and participation to monthly meetings of the associations.

services are the central actors in the organisation of the associations, their interventions are crucial. In this sense, they still operate following a top-down model.

Also, the clandestine nature of the value chain restrains the establishment of relations of trust between producers and other local actors. Production and marketing are hidden, one producer recounted, “who is not seen, is not remembered”.¹¹⁴ The concept of social capital allows a better understanding of the network structure within the value chain and of the sources of innovation.¹¹⁵ Indeed, trust relations are usually strong among the family members living on the farm, which increases bonding social capital and allows maintenance of tradition, transmitted from generation to generation. Distances between farms are great and each family is isolated from the others. Conflicts or denunciations occur between different families of producers, especially between legalised and non-legalised ones, with the latter accusing the former of benefiting from the veterinarians of the inspection services. Bonding social capital, represented by strong family ties which correspond to the production unit, is much more important than the few forms of linking and bridging social capital between different families and communities. For example, the ties between members of the same church or between participants of rodeos are not very strong, as they meet infrequently.

Similarly, bridging social capital between producers and various other actors (veterinarians, politicians, etc.) is low, except for the advisory services, which enjoy a high level of trust from the producers as they are close to the families and have worked with them since the beginning of peasant farming. Moreover, local politicians like the municipal functionaries of agriculture have little involvement in the development of the value chain, resulting in a lack of trust in them. For example, the agricultural functionary is responsible for the management of machinery available for the producers, but the latter often complain that access is difficult and often not available when they need it; likewise, the lack of paved roads within the municipalities inhibits trade and access to meetings.¹¹⁶ Additionally, there is a disagreement in the perception of sanitary risks of raw milk between the producers and the veterinarians of the inspection services. Only industrial and large-scale production standards are taught at the universities; small-scale and artisanal production is not a subject there. Sometimes conflicts occur because producers want to defend the artisanal raw milk cheese produced from generation to generation, whereas veterinarians see these practices as a potential danger to the health of consumers. The advisory services more often support the point of view of the producers, although they are aware of the necessity of the sanitary norms. However, during the last field visit in March 2018 we saw an increase in communication between producers and veterinarians, who shared and discussed their views on the subject, thus increasing bridging social capital. More and more veterinarians are assuming a role of advisor rather than controller in their dealings with producers.

In this sense, associations allow bringing together producers from different families or communities with other actors (advisory services, veterinarians, local politicians, etc.). This reinforces the social capital between actors of the value chain and builds up weak ties, a key

114 Interview conducted with a producer, São José dos Ausentes, 14 Sept. 2017.

115 Granovetter, *Strength*; Robert Putnam, *Bowling Alone: The Collapse and Revival of American Community*, New York 2000.

116 Carine Pachoud/Martin Coy, *Relações de proximidade entre atores locais e as dinâmicas de desenvolvimento territorial: análise da cadeia produtiva do Queijo Artesanal Serrano nos Campos de Cima da Serra/RS*, in: *Revista Brasileira de Gestão e Desenvolvimento Regional* 14/2 (2018), 157–182.

element in information flows and innovation processes. This temporary proximity during meetings is important in reducing the isolation of some producers and in creating opportunities for sharing and discussing the different points of view. Moreover, this diversity of producers and other stakeholders can be a great benefit for the emergence of new ideas and innovations, but also for the maintenance and valorisation of traditions which can be protected through geographical indications. The complementarity of both sides in traditional food value chains is a motor of territorial development.¹¹⁷ In this case, the agricultural advisory services, which already have well-established links with producers, facilitate the formation of bridging social capital between producers and other actors at association meetings or other occasions such as courses, symposia, or competitions. Given time, this can allow the formation of a dense group with shared language and representations, in other words, the creation of bonding social capital. Moreover, new institutional arrangements appear to be an opportunity for local actors to link with actors at higher levels (such as state deputies) and build weak ties with them.

To sum up, we observe that, on the one hand, the territorial innovations come from the advisory services, which have a better overview of the value chain and its external pressures and information. On the other, the focus on traditions seems to come from the producers, transmitting know-how from generation to generation. Thus, innovations sometimes face resistance from producers. For example, many do not want to legalise their production facilities because they want to keep making cheese with wooden moulds instead of plastic ones and prefer to continue to sell on the quiet. Nonetheless, most producers adopt the technical innovations in the long run – for example, all producers today manage pastures. Some appear to be less resistant to technical innovations. Indeed, nine families out of the 67 interviewed have a specialised dairy system, meaning that they separate the dairy herd from the beef herd. Of these nine families, six also have the SIM certification.

The existing literature still provides few studies on the relationship between social capital and resilience in rural areas.¹¹⁸ Rural resilience determines the degree to which a specific rural area is capable of self-organisation to face changes and shocks¹¹⁹ and encompasses three dimensions: ecological, social, and economic.¹²⁰ Thus, social capital can be seen as the main aspect of social resilience in such areas.¹²¹ According to Hofferth and Iceland, people living in rural areas share more strong ties based on kin than people living in urban areas.¹²² Relationships in rural areas are often embedded in networks of close personal ties (strong ties),

117 Torre/Vollet, *Aux fondements*.

118 Wim Heijman et al., Rural resilience as a new development concept, in: Danilo Tomić/European Association of Agricultural Economists (eds.), *Development of agriculture and rural areas in Central and Eastern Europe. 100th Seminar of EAAE*, Novi Sad 2007, 383–396; Gonne Beekman et al., *Social capital and resilience in rural areas: responses to change*, working paper, Mansholt graduate school 2009; Mark Scott, *Resilience: a conceptual lens for Rural Studies?*, in: *Geography Compass* 7/9 (2013), 597–610; Lynda Cheshire et al., *Community resilience, social capital and territorial governance*, in: *Revista de Estudios sobre Población y Desarrollo Rural* 18 (2015), 7–38.

119 Heijman et al., *Rural resilience*; Nadine Marshall, *How resource dependency can influence social resilience within a primary resource industry*, in: *Rural Sociology* 72/3 (2007), 359–390.

120 Heijman et al., *Rural resilience*; Beekman et al., *Social capital*.

121 Beekman et al., *Social capital*.

122 Sandra Hofferth/John Iceland, *Social capital in rural and urban communities*, in: *Rural Sociology* 63/4 (1998), 574–598.

which are largely based on geographical location and shared norms (i.e. trust) and values.¹²³ In this point our research differs, as we find that strong ties mainly link producers belonging to the same family living on the farm, but not the producers of the entire rural community. This may result from the physical isolation of the families and poor transport infrastructures, which lead to a lack of interaction between families and therefore to a low level of trust. The high degree of bonding social capital can decrease rural resilience. Indeed, strong ties may obstruct the capacity for learning after changes or shocks and adapting in order to be able to anticipate and respond to further shocks and changes in the future.¹²⁴ In rural areas, the opportunity to develop weak ties providing information and promoting innovation is less,¹²⁵ although weak ties may lead to more resilience, as people can exchange information, experience, and capital in case of shocks.¹²⁶ In our study, advisors play an instrumental role in increasing the number of weak ties and therefore promoting resilience. Thus, a larger amount of social capital, through a well-balanced combination of weak ties that allow change and innovation and strong ties that allow maintaining traditions, can lead eventually to more resilience in rural areas.¹²⁷

Conclusion

Today, artisanal Serrano cheese is an important resource for cattle breeders in the Campos de Cima da Serra region, as it can represent up to 60 percent of these families' income. Ancestral know-how is still used in production and processing and feeding is essentially based on pastures of natural grasslands, although an intensification of production by the use of corn silage or soya has been observed in recent decades. Since the development of peasant farming and the creation of agricultural advisory services in the 1950s, the technical innovations brought by them have sometimes met with resistance from producers, who wanted to maintain traditional ways; but over time the innovations spread nonetheless.

In the artisanal Serrano cheese value chain, cheese making has been done individually on the farms since the beginning of its history, and there was no cooperation between producers to organise the value chain until the last decade. Indeed, the chain is short since the producer sells cheese directly to consumers at points of sale (cheese shops, markets) or through one intermediary. However, the illegalisation of cheese marketing resulting from the increase of controls, as well as competition with industrial cheese, led to an impasse for the production of artisanal Serrano cheese. In this way, cooperation through producers' associations appeared as one solution for local actors to keep producing and to defend the typical characteristics of the cheese and the related traditions. Nonetheless, this approach is still facing many problems: there is a lack of involvement on the part of producers; the advisory services are the central actors and the only trusted forces with links to the mainstream administration system; and there are many tensions between producers, veterinarians, and local politicians.

123 Beekman et al., Social capital.

124 Marshall, Resource dependency; Beekman et al., Social capital.

125 Hofferth/Iceland, Social capital, 577.

126 Woolcock, Place of social capital.

127 Beekman et al., Social capital.

The concepts of social capital and strength of ties appear promising for the analysis of resilience and of the ability to reconcile tradition with innovation. Indeed, the advisory services, as central actors in the territorial innovation process, allow the different actors (producers, veterinarians, politicians) to join through linking and bridging social capital. Bonding social capital is present only among the family members within production units. In this sense, peasant families are central actors for the maintenance of tradition by transmitting know-how from generation to generation. However, weak ties are necessary for collective organisation and for innovation to emerge. In this sense, advisory services are key actors in the strengthening of weak ties, which can over time lead to bonding social capital through the repeated interactions between actors. Nevertheless, the analysis shows the instability of local coordination between producers and the necessity for support from the advisory services for the operation of the associations.

Social capital is a central resource for cooperation: bonding social capital allows a dense network and the transmission of know-how from generation to generation, while linking and bridging social capital encourages the emergence of territorial innovations. The combination of both provides the resources to resist and adapt to changes, which forms the basis of resilience of the territory.



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The quality of territorial governance: an assessment of institutional arrangements. The case of the Serrano cheese production in the Campos de Cima da Serra, Southern Brazil

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Abstract

Territorial governance is of growing interest in an endogenous development perspective, in which organizational and institutional arrangements are supplied by the actors themselves to ensure coordination. This study was carried out in the Campos de Cima da Serra in southern Brazil, where the Serrano cheese is produced. It is an informal production. In fact, new consumers' preferences for young instead of matured cheese, and national hygiene standards that are incompatible with small-scale and artisanal production make the legalization of the sales impossible for the producers. The aim of the study is twofold. First, it brings forward the territorial and value chain governance approaches from French- and German-speaking literatures. Second, based on the analysis of institutional arrangements, it assesses the quality of territorial governance processes. For that end, the institutional arrangements implemented in the states of Santa Catarina and Rio Grande do Sul, in the Campos de Cima da Serra, were analyzed. Results show that two different strategies are adopted: In Santa Catarina, there is a strong coordination between all municipalities, whereas in Rio Grande do Sul, municipalities are acting independently, leading to less effective governance. However, institutional arrangements in both states are facing a lack of dynamism. They suffer especially from little mobilization of producers and little involvement of local authorities. The extension services are the central actors of the collective action, following a top-down model. Thus, the achievement of collective action would require more participatory governance through the integration of the different actors in the process, as well as support from the larger institutional environment.

Zusammenfassung

Regionale Governance ist im Hinblick auf eine regionale Entwicklungsperspektive von wachsendem Interesse. Um eine Koordinierung zu ermöglichen, werden organisatorische und institutionelle Arrangements von den Akteuren selbst geschaffen. Diese Studie wurde in der Campos de Cima da Serra Region in Südbrazilien durchgeführt, wo der Serrano-Käse hergestellt wird. Dabei handelt es sich um eine informelle Produktion. Aufgrund der Präferenzen der Konsumenten für jungen statt reifen Käse sowie aufgrund neuer nationaler Hygienestandards, die mit der Produktion kleiner und handwerklicher Betriebe unvereinbar sind, wurde der Käseverkauf für illegal erklärt. Diese Studie verfolgt zwei Ziele. Erstens werden die Ansätze zur territorialen Governance sowie zur Governance in Wertschöpfungsketten der französischen und deutschen Literatur vorgestellt. Zweitens bewertet sie die Qualität der territorialen Governance-Prozesse auf der Grundlage der Analyse der institutionellen Arrangements. Dazu wurden die umgesetzten Arrangements in den Bundesstaaten Santa Catarina und Rio Grande do Sul auf den Campos de Cima da Serra analysiert. Dabei zeigen die Ergebnisse, dass zwei verschiedene Strategie-

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gien verfolgt werden. Während es in Santa Catarina eine starke Koordination zwischen allen Gemeinden gibt, arbeiten die Gemeinden in Rio Grande do Sul unabhängig, was zu einer weniger wirksamen Governance führt. Jedoch sind die institutionellen Arrangements beider Staaten mit mangelnder Dynamik konfrontiert. Sie leiden insbesondere unter geringer Mobilisierung der Produzenten sowie geringer Beteiligung lokaler Behörden. Beratungsdienste sind nach einem Top-Down-Modell zentraler Akteur der kollektiven Maßnahmen. Der Erfolg der kollektiven Maßnahmen würde somit eine stärkere partizipative Governance durch die Einbeziehung der verschiedenen Akteure in den Prozess sowie eine Unterstützung des weiteren institutionellen Umfeldes erfordern.

Keywords territorial governance, institutional arrangement, mountain cheese, Brazil

1. Introduction

Globalized and production-oriented agriculture often leads to spatial inequalities and the exclusion of peripheral rural regions (Torre and Vollet 2016). Rural mountain regions, where cheese production is significant, are particularly affected by this phenomenon. Indeed, rural mountain areas are generally less provided with infrastructure, difficult to access and far away from political decision-making. These areas can hardly compete with urban and more developed rural regions concerning generic resources (e.g. labor and infrastructures) (Colletis and Pecqueur 2004). However, globalization offers new paths of development for these territories through endogenous development based on local resources, cultures and identity, in order to propose specific and differentiated goods and services (Pecqueur 2001). This process depends on the ability of the local actors to act collectively to valorize the resources of the territory (Torre and Vollet 2016).

On the one hand, the value chain approach is a common approach to describe the sequence of activities implemented from the conception until the marketing of a product. It is mainly based at the global level and sets the local in a perspective of adaptation to globalization (Gereffi et al. 2005). On the other hand, the notion of territorial governance is of growing interest in an endogenous development perspective. Territorial governance refers to horizontal mode of coordination between local actors, but also integrates vertical relationships between different administrative levels (Pasquier et al. 2007). This concept considers new issues related to public action, such as the participation of local actors which involves cooperation between all types of actors to achieve common goals (Furst 2001: 1; Pasquier et al. 2007: 58). Spatial concentration of activities and social interactions based on geographical and social proximities are the key determinants

of territorial governance (Torre and Rallet 2005). Localized institutional arrangements aim at gathering around territorial issues and supporting and securing a framework for collective action (Muchnik et al. 2007).

The analysis was conducted in the Campos de Cima da Serra region in southern Brazil, where the Serrano cheese is produced. In this region, small-scale cheese production became the backbone of the economy. Today we are observing a growing demand for this cheese. However, the production has become informal partly due to new expectations of consumers. Indeed, consumers look for young cheese of less than thirty days of maturation but the Brazilian legal framework does not authorize the selling of raw milk cheese with less than sixty days of maturation. Moreover, national hygiene standards are incompatible with conditions of small-scale and artisanal production. Nonetheless, since the last decade we have observed an increase of collective actions through the implementation of localized institutional and organizational arrangements aiming at recognizing the Serrano cheese and legalizing its sales. The production area is, though, located between two states: Santa Catarina and Rio Grande do Sul. These two states have different political and institutional contexts, thus leading to different arrangements.

The aim of this article is twofold. First, it compares German- and French-speaking literatures on value chain governance and territorial governance. Indeed, French-speaking literature is usually rarely translated and thus hardly accessible, although this perspective appears interesting for the study. Second, it analyzes the way in which localized institutional and organizational arrangements generate better territorial governance processes in excluded mountain rural areas. There is a lack of assessing methods of gover-

nance processes as previous studies mainly focused on describing governance modes based on an outcome approach (Fürst 2007). The present article will complement this research by enriching the reflections on territorial governance processes through a comparative analysis of institutional and organizational arrangements implemented in both states.

The article is structured as follows: the initial section outlines the conceptual framework which puts into perspective the notions of territorial governance and value chain governance. Then, the third and the fourth section present the case study and the methods respectively. After that, the fifth part brings forward the results. Last, the sixth section outlines the conclusion.

2. Theoretical framework

In French literature, the concept of territorial governance is of growing interest to analyze coordination processes among actors producing goods or services in a given territory (Torre and Vollet 2016), whereas in German literature the notion of value-chain governance is more widely used. In this section, the different concepts will be outlined and put into perspective.

2.1 The relevance of territory to analyze governance

In German literature, the term of *region* is mainly used to characterize local governance (Fürst 2007), whereas in French literature, we see a renewed interest in the concept of *territory* since the 1980s, especially in social geography (Di Méo 2016). By contrast, *territory* in German literature is considered predominantly as a political space, similarly to the notion of *region* in French literature (Di Méo and Buléon 2005). According to Di Méo (2016), *territory* is a social construct which combines individual and collective dimensions. It is not only the space of our everyday life that includes a material dimension, associated with practices, but also refers to the ideal dimension of representations (e.g. symbols). It is also the framework for collective action with particular governance structures. Indeed, the geographical and social proximities between actors favor the mobilization of actors, encourage cooperation around common projects and best articulate public action to local characteristics (Pasquier et al. 2007).

Territorial governance has been defined by Rey-Valette et al. (2010: 4) as "a dynamic process of coordination between actors that are geographically close but with multiple identities (e.g. public, private) and asymmetrical resources (e.g. power, status) around territorialized issues. Territorial governance aims at the collective construction of objectives and actions by implementing multiple arrangements that are based on collective learning and participate in institutional and organizational reconfigurations/innovations within the territories". Territorial governance is understood as a horizontal mode of coordination between different actors. Nonetheless, it also integrates vertical relationships with upper decision-making levels (Pasquier et al. 2007: 58). Participation of the various actors involved (not only productive) is a central principle and includes many dimensions, for example equity and empowerment (Davoudi et al. 2008). Also, territorial governance considers power relations and their resulting conflict dimension (Torre and Beuret 2012: 64).

Institutional arrangements refer to the set of codified rules, including monitoring and sanctioning mechanisms, and to formal collective organizations (Ostrom 2007). Institutional arrangements (including organizational arrangements) constitute the dynamic architecture of territorial governance (Lardon et al. 2008). They depend on local specificities (Gilly and Wallet 2005). The challenge of institutional arrangements is to organize the discussion and the coordination between the various actors involved in order to agree on common objectives (Polge 2015: 46). For this purpose, they need to adapt and readjust permanently to ensure the diversity of actors, their representativeness, their independence and the equality in terms of participation and access to information (Lardon et al. 2008). The success of collective action is therefore highly dependent on the institutional arrangements supplied by local actors themselves (Ostrom 1990).

2.2 Perspectives on territorial and value chain governance

The value chain approach that is largely used in German-speaking geography (Dannenberg and Kulke 2014), provides information on the structure of production systems and the relationships between key actors. It corresponds with the sequence of activities implemented from the conception until the marketing of the product. Research on value chains has become

relevant especially at the global level (Gereffi et al. 2005; Henderson et al. 2002). Furthermore, agro-food industries have been a fertile ground for empirical applications of the value chain approach (e.g. Dannenberg 2011; Neilson and Pritchard 2009). The approach has benefited from many contributions of the Filières analysis, developed by French economists in the 1970s (Lenz 1997). The concept of value chain governance has significant involvement with regard to the control of the production process and to the capacity for appropriation of the value created along the chain (Henderson et al. 2002). Gereffi et al. (2005) developed five modes of governance, determined by the power relations between firms: governance by the market, modular governance, relational governance, captive governance and vertical integration. These patterns are mainly based on three factors: the complexity of the knowledge and the extent to which this knowledge can be codified as well as the capabilities of the suppliers.

Value chain and territorial governance provide different perspectives of analysis. On the one hand, the value chain approach focuses on the sequence of complementary activities involved in the design, production and marketing of a product. Mainly based at the global level, this approach takes into account structural constraints emerging from globalization and set the local in a perspective of adaptation to these global processes (Gereffi et al. 2005). Furthermore, many recent studies have analyzed how small-scale farmers are integrated into large-scale value chains (see e.g. Dannenberg and Kulke 2005). On the other hand, the territorial approach gives a relevant reading of the role of local synergies in development dynamics. Territorial governance offers new forms of collective action based on geographical and social proximities (Torre and Rallet 2005) and above all aims at promoting local development (Torre and Vollet 2016). Also, this implies a redefinition of the notion of quality, principally linked to the origin (Marsden et al. 2000; Pecqueur 2001). In territorial coordination, actors who influence the organization of production systems, such as institutions or consumers, play a central role (Marsden et al. 2000; Torre and Vollet 2016). Moreover, the territory allows agricultural activity to be conceived beyond its material production alone and to give it back its cultural and social dimension (Muehnik et al. 2007).

The demand for Serrano cheese is growing (Cruz 2012). However, cheese production is still largely informal, because of administrative constraints and consumer preferences, which prevents the farmers to find a niche for larger-scale markets. Indeed, face-to-face relations between producers and institutional actors (e.g. extension services) as well as between producers and consumers predominate. In this sense, the notion of territorial governance seems to be more appropriate for the present case study and, therefore was chosen for the analysis.

3. Case study

In this section, the first part presents the characteristics of the Serrano cheese production, the extension services and the regulation systems. Then, the second part brings forward the question of governance in rural territories in Brazil.

3.1 The Serrano cheese production

3.1.1 Characteristics of the production

The Serrano cheese is a traditional raw milk cheese, produced as a by-product of beef cattle farming in the Campos de Cima da Serra region. This region is located in two different states: Santa Catarina, which gathers eighteen municipalities and Rio Grande do Sul, which regroups sixteen municipalities (see Fig. 1) (Vieira and Dortzbach 2017). The region is isolated, with low infrastructure development and a low population density (10.2 inhabitants/km²) (Ambrosini 2007).

Livestock farming is the main economic activity in the region. More than 90% of the farms are small-scale family breeding systems (Ambrosini 2007). It is estimated that more than two thousand families produce Serrano cheese (one thousand families in each state). In doing so, for most of them cheese making is the principal economic activity on the farm (more than 50% of the revenue) (Ries et al. 2014). The most common production system is an extensive mixed dairy-beef livestock system. Production is low: the average cheese production per farm per day is about 10 kg (Ambrosini 2007).

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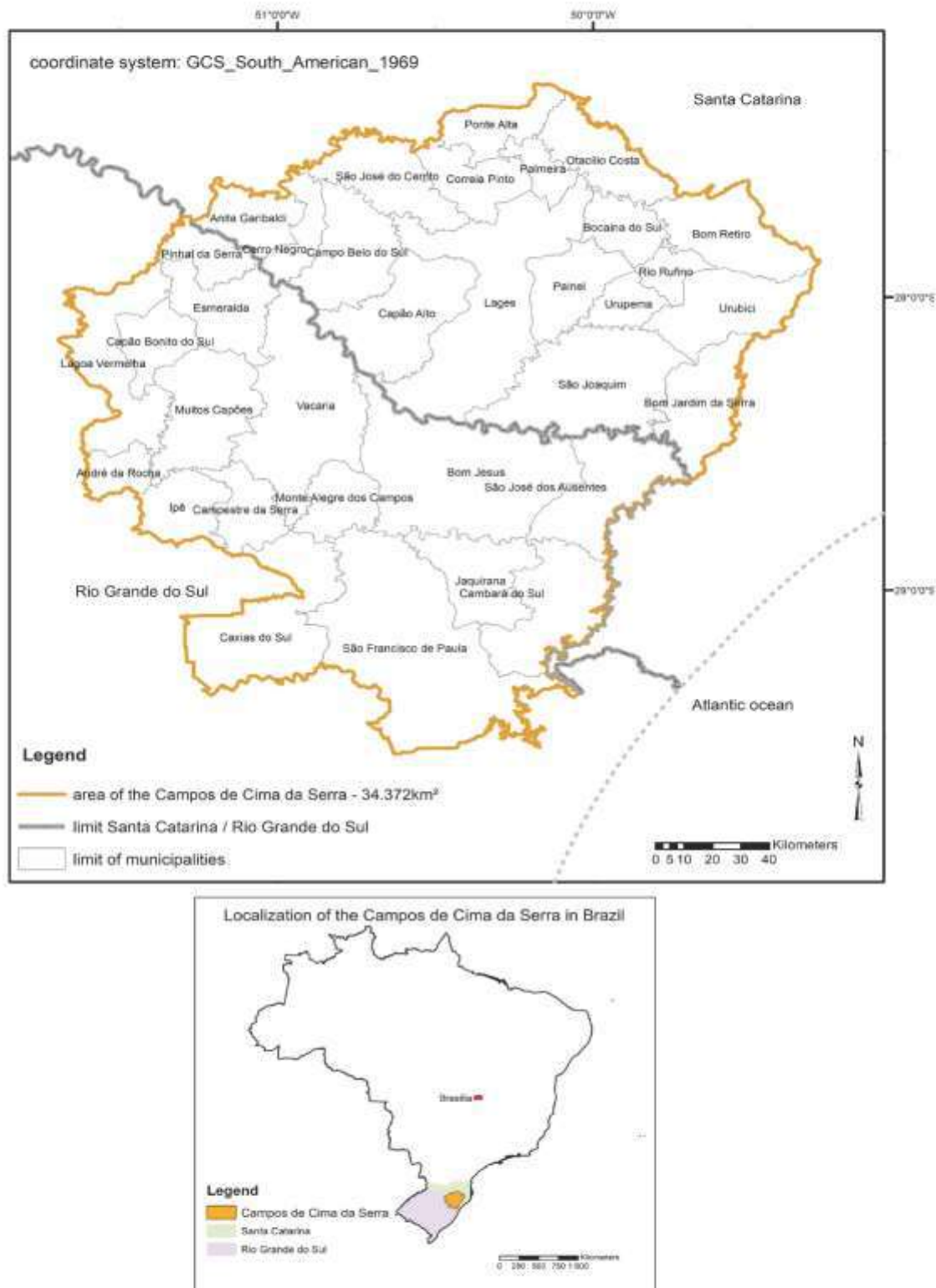


Fig. 1 Geographical area of the Campos de Cima da Serra. Source: own elaboration based on IBGE (2018)

3.1.2 The extension services

In Santa Catarina, the EPAGRI-SC is the public Company of Agricultural Research and Rural Extension. It is linked to the Secretary of State for Agriculture and Fisheries and was created in 1956. There are two regional offices and every municipality has its own office. At the regional scale, one extension agent coordinates a group of eighteen extension agents (one in each municipality) working especially on the Serrano cheese production.

The EPAGRI-SC signed agreements with the Ministry of Agriculture, Livestock and Food Supply (MAPA). In 2008, the first one was signed in order to implement projects with the objective of promoting the historical recovery of the Serrano cheese. It also aimed at registering and training producers, analyzing the physical, chemical and microbiological characteristics of the cheese as well as describing production and manufacturing processes. In 2013, the second agreement aimed at obtaining the label of denomination of origin *Campos de Cima da Serra*. This designation of origin allows for protecting the Serrano Cheese and valorizing the typicality of this cheese through the recognition of the region of production and the know-how of production and processing (Vieira and Dortzbach 2017).

In the Rio Grande do Sul, the EMATER-RS is the Company of Technical Assistance and Rural Extension, created in 1955. This institution is private and has no agreements with the MAPA to implement joint projects with the EPAGRI-SC. There is one regional office and all municipalities have their own office with one or several extension agents working directly with the producers. At the EMATER-RS, there is no group dedicated to the Serrano cheese production. The extension agents have to deal with all activities led by the services and all kinds of productions.

3.1.3 Legislation and regulation systems

The Brazilian legal framework does not authorize the selling of raw milk cheese with less than sixty days of maturation since law n°1.283 came into force in 1952 through regulation n°30.691 (*Presidency of the Republic of Brazil* 1950, 1952). The majority of Serrano cheese producers do not respect this restriction. As consumers prefer young cheese over matured one, producers sell their product within less than thirty days. This makes their sales illegal. Moreover, the san-

itary norms in Brazil for dairy products do not consider the specificities of artisanal production. Instead, artisanal production is subject to the same sanitary standards and facilities as big dairy industries. Thus, high costs of adaptation make it impossible for small scale farmers to comply with the requirements (Cruz 2012).

Today, there are two kinds of certification authorizing the marketing of Serrano cheese but only for mature cheese, ripened for more than sixty days. First, the certification delivered from the municipal inspection service (SIM) authorizes the marketing of Serrano cheese within the area of the municipality. The inspection veterinarians employed by the prefectures of the municipalities control the health of the herd and the adequacy of the infrastructures. Only eighteen families have the SIM certification within the region. Second, at the state level in Santa Catarina state, the law for authorizing Serrano cheese sales has been signed in September 2016 (Law n° 17.003/2016) and the decree in July 2017 (Decree n°1238/2017) (*State of Santa Catarina* 2016, 2017). In the state of Rio Grande do Sul, the law n°14,973 which legalizes the commercialization of Serrano cheese, was approved in December 2016. The decree n°54.199 was approved in August 2018 (*State of Rio Grande do Sul* 2016, 2018). However, no producer has yet obtained the state certification. At the federal level, there is no legislation authorizing the Serrano cheese sales in the country.

In this context of informality, the majority of Serrano Cheese is sold locally. Consumers usually come to the farms to buy the cheeses, but producers also take the cheese to the market, and even intermediaries buy the cheeses on the farms to sell them in bigger cities (Cruz 2012).

3.2 Governance in rural territories in Brazil

From the 1960s, the development of rural areas was associated with the process of agricultural modernization through the substitution of factors considered to be outdated. Thereby, technical innovations from research were diffused to rural properties by agricultural extension services. This process called 'green revolution' was led by actions of the government and international institutions (Schneider 2010). The green revolution also called 'conservative modernization', which involved especially large agricultural exploitations and maintained the structure of the agrarian system in place (latifundium vs. minifundium) (Coy and Neuburger 2002).

Nonetheless, the 1988 constitution provided new opportunities for civil society participation (Grisa and Schneider 2014; Polge 2015: 48). In fact, since the 1990s, a change of focus and understanding about rural development has gained ground in Brazil, revitalizing the theme and generating new approaches. Discussions about family farming and its potential became a political and social category, recognized by the Brazilian government in the mid-1990s. This recognition was strongly linked to the re-organization of social movements and organizations that had been repressed during the military dictatorship and now returned to the political arena. The process of re-emergence of the debate on rural development and of the recognition of family agriculture in Brazil resulted in the growing influence and action of the government and the formulation of public policies. First, the National Program for the Strengthening of Family Agriculture (PRONAF) was created in 1995 to support the agrarian reform settlements and give credits to family agriculture. The PRONAF also triggered the emergence of other differentiated rural development policies (i.e. food security policies, land regularization, support to indigenous peoples) (Schneider 2010). Second, the Ministry of Agrarian Development (MDA) was created in 1999 to represent family agriculture. The MDA stood as an alternative and an opposition to the notion of agribusiness that produces commodities mainly for export, represented in turn by the MAPA. In 2006 the Family Agriculture Act was implemented, which recognized the social category, defined its conceptual structure and started to standardize public policies for this social group (Grisa and Schneider 2014).

However, policies concerning family farmers are still insufficient to promote territorial development. Indeed, there are great challenges for local actors to become protagonists of development processes and make their own decisions (Polge 2015). Moreover, we are witnessing a regression regarding the debate and recognition of family agriculture since 2016, including the abolition of the Ministry of Agrarian Development and the reduction of the budget allocated to family agriculture.

4. Methods

This section presents the methods used to collect the data and to qualitatively assess territorial governance.

4.1 Data collection

The data for this contribution has been collected through semi-structured interviews with local actors during three sessions of field work. The first field work was conducted in February 2017, the second one in August and September 2017 and the third one in March 2018. A total of sixty-seven producers and extension agents, inspection veterinarians and secretaries of agriculture were interviewed in eight municipalities of the Campos de Cima da Serra region. In addition, one interview was realized at the head office of the EMATER-RS and two at the regional office of the EPAGRI-SC. Finally, one interview was conducted with a deputy at the Rio Grande do Sul state assembly, involved in the defense for the legalization of the Serrano cheese.

The questionnaire used with the producers refers to the qualitative study of the relations between the actors (i.e. the degree of trust, description of conflicts). It also concerns the degree of involvement in collective organizations (e.g. frequency of participation in associations) and the main difficulties that these organizations face according to the interviewed actor.

The questionnaire used with the extension agents, inspection veterinarians and secretaries of agriculture also refers to the qualitative study of the relations between actors (i.e. the degree of trust, description of conflicts). Besides, it is related to the description of the operation of different institutions and collective organizations (extension and inspection services, associations, federations, etc.) and the main difficulties that they face.

Furthermore, legislative texts (laws and decrees) and legal status of associations were analyzed.

Finally, we participated in four monthly meetings of producers' associations and in one technical meeting with the group of extension agents of the EPAGRI-SC dedicated to the Serrano cheese, in order to better understand the functioning of the institutions and the relations between actors.

4.2 Qualitative assessment of territorial governance

The assessment, based on eight indicators, of territorial governance was realized by means of the quali-

tative evaluation of the institutional arrangements implemented in both states. These indicators are adopted from a method developed in 2009 by the Secretariat of Territorial Development (SDT) of the Ministry of Agrarian Development (MDA). This method was created to assess institutional arrangements in Territórios da Cidadania (Territories of Citizenship), which are projects of development in disadvantaged rural regions and were implemented by the government through the SDT/MDA (MDA/SDT 2014; Piraux 2014; Piraux and Caniello 2016). The eight indicators are the following:

- available institutional services;
- involvement of local authority;
- management of conflicts;
- capacity of mobilization;
- dialogue with the state;
- improvement of social and cooperative relations;
- capacity of exchange of experiences and knowledge;
- technical capacity in relation to projects.

The assessment was based on three scores: good, average and bad according to the analysis of the institutional arrangements that have been realized previously.

5. Results

In this section, the first part presents the analysis of the institutional arrangements implemented in the two different states of the Campos de Cima da Serra. The second part outlines the qualitative assessment of the territorial governance, derived from the results of the first analysis.

5.1 Institutional arrangements implemented in Santa Catarina and Rio Grande do Sul

5.1.1 Santa Catarina

In 2009, the Consórcio Intermunicipal Serra Catarinense-CISAMA was created under the incentives of the Association of Municipalities of the Serrana Region-AMURES, which regroups the eighteen municipalities of the Campos de Cima da Serra in Santa Catarina. The CISAMA links together different institutions involved in the value chain (secretaries of agriculture, extension services, inspection services,

etc.) and allowed for the creation of the municipal inspection services in each municipality and the standardization of the norms between them. There is one technical responsible for the inspection services at a regional level, who unifies the information and gives guidelines to the SIM. Until today, six families received the SIM certification and twenty-four others entered the process of legalization. However, some municipalities show a low involvement in the development of the Serrano cheese production and do not employ an inspection veterinarian, thus preventing the producers from entering the process of legalization.

Furthermore, the producer association APROSERRA, grouping the eighteen municipalities of Santa Catarina state, was created in 2013 under the incentives of the EPAGRI-SC. The objectives of the association are the qualification of the Serrano cheese and the legalization of its sales. Today, more than seventy families are members of the association. Meetings are organized monthly to exchange information between members. Members can also participate in courses given by the extension services to improve the hygiene of milking as well as the cheese fabrication. Through the existence of the APROSERRA, the state government contributed to 50% of the construction costs of thirty-two dairies in 2016.

Last, the association allowed the creation of six Clubs of Integration and Exchange of Experiences (CITES). They are smaller groups of producers between different municipalities. The aim of the CITE group is to regroup producers in order to strengthen their technical knowledge and increase the interactions between different municipalities as well as to improve the quality of production. This method was developed through an agreement between the EPAGRI-SC and the MAPA. There is a monthly meeting to exchange experiences on the farms with a presence at least of one extension agent of the EPAGRI-SC for technical support.

5.1.2 Rio Grande do Sul

The Association of the Municipalities of Campos de Cima da Serra - AMUCSER - regroups municipalities in Rio Grande do Sul, based on the model of AMURES in Santa Catarina. However, AMUCSER joined only eleven prefectures of the sixteen municipalities producing Serrano cheese and there is no consortium that allows a standardization of the SIM between municipalities. This has resulted in a difference of norms re-

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quired for the legalization of dairies. Moreover, like in Santa Catarina, not all municipalities have inspection veterinarians because of a lack of investment of the prefectures. Today, twelve families have certificated dairies, and many are in the process of legalization.

In Rio Grande do Sul, three associations of producers were created under the EMATER's incentives in order to strengthen the legalization of the cheese. The first association, called APROCAMPOS, in the municipalities of São José dos Ausentes and Bom Jesus was created in September 2010. There are currently forty-two members. Thereafter, APROJAC was created in 2012 in the municipality of Jaquirana. In 2017 the municipality of Cambará do Sul decided to join the association because of the difficulty to recruit new members. Actually there are twenty-six member families.

Lastly, APROSAOCHICO was created in 2016 in the municipality of São Francisco de Paula and today includes only six producer families. Even though Rio Grande do Sul was pioneer in the creation of associations, until today only five municipalities created an association.

Through the Program FEAPER, the state Secretariat for Rural Development, Fisheries and Cooperatives allowed a rural credit to fifteen families, members of the different associations for the construction of small dairies. It funded different projects as the building of the head office of APROCAMPOS. In addition, the Banco do Brasil Foundation offered, via APROCAMPOS, a financial support of 80% of the construction costs for nine small dairies. *Figure 2* presents the different institutional arrangements implemented in the Campos de Cima da Serra in Brazil.

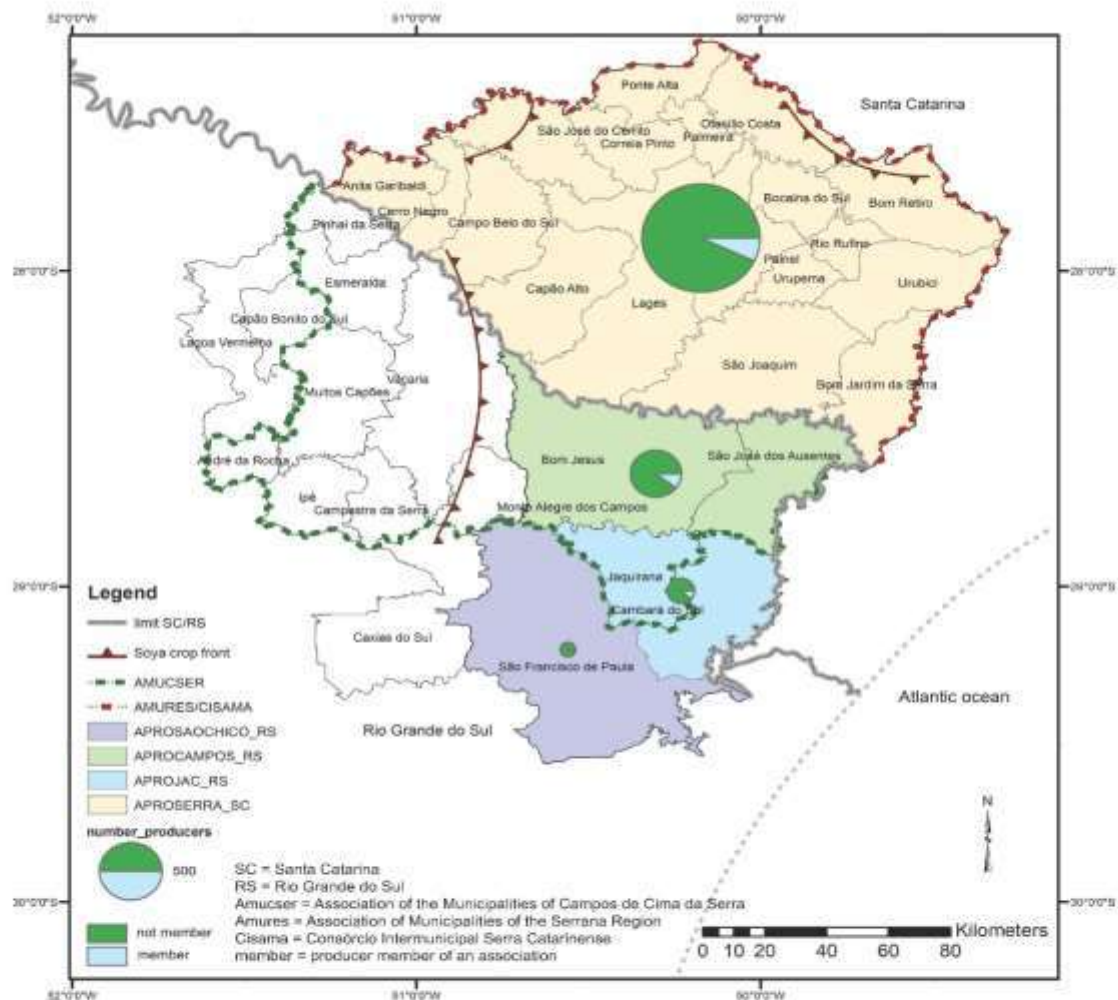


Fig. 2 The different institutional arrangements implemented in the Campos de Cima da Serra. Source: own elaboration

5.1.3 Toward cooperative relations in the whole Campos de Cima da Serra region

The federation FAPROQAS, which gathers the four associations of the region, was created in 2017. It represents the first official partnership between two different states and gathers six producers of Santa Catarina and six of Rio Grande do Sul, all members of the board of directors of different associations, as well as some extension agents. The APROSERRA coordinates the Federation. The federation was a prerequisite to request the designation of origin at the National Institute of Industrial Property (INPI) in 2017.

Since 2012, the Interstate Symposiums of Serrano Cheese between all municipalities are organized every two years by the EMATER-RS and the EPAGRI-SC. The symposium is an important space for discussion among producers, technicians and public authorities on issues related to the production and to the legalization at the municipal, state and national level.

5.2 Qualitative assessment of the governance

The description of the institutional arrangements between two different institutional and political contexts allows assessing the quality of territorial governance processes. This qualitative assessment for both states is based on eight indicators taken from the method developed by the SDT/MDA in 2009 and exposed in Table 1.

Table 1 Qualitative assessment of territorial governance processes in the Campos de Cima da Serra based on eight indicators taken from the method developed by the SDT/MDA in 2009 (MDA/SDT 2014; Piraux 2014; Piraux and Caniello 2016)

Indicators*	Santa Catarina	Rio Grande do Sul
Available institutional services	+/-	-
Involvement of local authority	-	-
Management of conflicts	+/-	-
Capacity of mobilization	-	-
Dialogue with the state	+/-	-
Improvement of social and cooperative relations	+	+/-
Capacity of exchange of experiences and knowledge	+	-
Technical capacity in relation to projects	+	+/-

* + = good score; +/- = average score; - = bad score

The first indicator corresponds to the 'availability of institutional services' (i.e. extension services, inspection services). In both states, there is at least one extension agent available in each municipality. Regarding the inspection services; in Santa Catarina, a municipal inspection service was created in every municipality through the action of the CISAMA. However, some municipalities do not employ an inspection veterinarian. In Rio Grande do Sul, not all the municipalities have a service of inspection or employed an inspection veterinarian. This issue, due to a lack of investment from the prefectures, impedes the legalization process of dairies in the concerned municipalities.

After that, 'the involvement of local authorities' in institutional arrangements is small in both states. For example, they rarely participate in collective organizations, such as associations, or, as described beforehand, they do not always employ an inspection veterinarian.

The third indicator concerns the presence of structures to resolve conflicts. In Santa Catarina there is a consortium that gathers the different actors together and standardizes the norms of legalization. In this sense, the structure allows limiting conflicts, especially between inspection veterinarians. Besides, a regional coordination of the extension services limits the appearance of conflicts through a better dialogue between the different municipalities. In Rio Grande do Sul, such structures are not present. Moreover, many municipal extension agents reported the deficiencies of the management in the regional office as well as conflicts between the regional direction and the municipal offices, resulting in a lack of dialogue.

The indicator 'capacity of mobilization' concerns the number of actors involved in institutional arrangements and the frequency of meetings. We observed that there is a lack of dynamism within the associations, with little engagement from the producers. Indeed, there are still few members within the associations (Fig. 2) and many producers do not participate regularly in monthly meetings. The extension services are central for the functioning of the associations and for taking initiatives and decisions. Also, the creations of the state laws, as well as the request for the designation of origin were enabled by the actions of the extension services. Thus, they are the drivers of collective action, however, following a top-down model.

Concerning the indicators 'dialogue with the state' and 'technical capacity in relation to projects', Santa Catarina has a better ability to communicate with the state, as the EPAGRI-SC is a public institution. It can easily receive financial support from the state through agreements to conduct the project. In addition, the dedication of eighteen extension agents on Serrano cheese production and the fact that extension and research are linked together allows for giving more attention and weight to the development of the cheese production and to have a greater political strength. Nonetheless, concerning inspection services we observed a lack of dialogue between the municipal inspection services with the state inspection services in both states. Many producers, veterinarians and extension agents complain about the norms imposed at the state level being too strict and not complying with small-scale and artisanal production.

After that, in both states there was an improvement of social and cooperative relations between the producers after the creation of the associations. Indeed, before the creation of the associations there was no formal exchange between the producers. In Santa Catarina, cooperative relations between institutional actors of the different municipalities were established through a strong coordination, whereas in Rio Grande do Sul we saw a lack of cohesion between the municipalities. AMUCSER does not include all municipalities of the production region. Moreover, there are only three associations in five of the sixteen municipalities and there is no coordination between the associations. Indeed, the associations are developed in municipalities located in the East because on the West side cheese production is less important. Here, commodity crops, especially soya developed due to more favorable pedo-climatic conditions, representing up to 46% of the municipality area. To a smaller extent (until 8% of the municipality area), the advance of soya crops can also be observed in the West and North of the region in Santa Catarina (IBGE 2017). In this sense, the advance of soya crops seems to inhibit collective action emergence for the defense of Serrano cheese. Moreover, Italian immigration has been more important in the East side of the region, where Serrano cheese production is not part of their culinary identity. This also explains the lower proportion of Serrano cheese producers (Fig. 2).

At the Campos de Cima da Serra region level, communication and exchanges between the two states are mainly realized by the extension services. These

exchanges are based on official meetings in order to define the research lines and organize the interstate symposium, as well as on local events like cheese competitions, municipal fests, etc. However, there is little exchange between the inspection veterinarians of the two states. Subsequently, the interactions between producers began to develop after the creation of the FAPROQAS. Notwithstanding, interactions between producers' leaders of the collective action, are still very isolated.

Finally, concerning the indicator 'capacity of exchange of experiences and knowledge', the associations in both states and the CITES in Santa Catarina represent important areas of discussion between producers and extension agents. Additionally, the technical group of the EPAGRI-SC dedicated to the Serrano cheese production as well as the coordination between the inspection services in Santa Catarina allow more exchanges between technicians and also a better technical capacity in relation to projects compared to Rio Grande do Sul.

6. Conclusion

The Campos de Cima da Serra, where the Serrano cheese is produced, is located between the states of Santa Catarina and Rio Grande do Sul. The two states have different political and institutional contexts, which allows for drawing a comparison between the institutional arrangements implemented in both states in order to qualitatively assess territorial governance. On one hand, in Santa Catarina, the project of valorizing and legalizing Serrano cheese sales is implemented at a regional scale by a strong coordination between the municipalities, whereas the process is independent between municipalities in Rio Grande do Sul. Also, not all the municipalities carry out projects of cheese valorization in Rio Grande do Sul. It is important to note that where soya crops are expanding, especially in the Southwest of the region, there is no form of collective action for cheese valorization.

The quality of governance processes depends on the integration of the different actors (Pasquier et al. 2007). However, we showed that the extension agents of the municipalities were drivers of collective action, following a top-down model. This leads to a low level of initiative and participation of the producers in collective action. Many findings have already demonstrated that top-down models are rarely efficient

and successful for collective action (Darré 1996; Ostrom 2004). Local actors need to build in common institutional arrangements in order to master their own model of development. This is why they require a more participatory governance framework, based on horizontal coordination (Pasquier et al. 2007). Also, coordination between the two states appears instrumental for common initiatives in the whole production area. Thus, success of collective action is highly dependent on the institutional arrangements constituted by local actors in a self-governing process. Implementation of multiple layers of nested organizations (e.g. associations and federations) at the local level is a central condition for achieving governance robustness. Nonetheless, governments are also important in potentially performing collective action (Ostrom 1990). In our case, the lack of legal frameworks for cheese production constitutes a major blocking factor to local initiatives. Complementarity between localized institutional arrangements embedded in a larger institutional environment is therefore instrumental for long-enduring governance.

Furthermore, the establishment of cooperation with other territorial actors, related for example to the growing tourism, increases the complexity of territorial coordination but appears important for a better valorization of the cheese (Pecqueur 2001). The combination of these elements is crucial to meet quality standards and qualification of the Serrano cheese and, in a larger extent, to the development of the territory as a whole.

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Collective action for cheese differentiation in the province of Trento/Italian Alps: an institutional approach.

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Abstract

Collective action for quality differentiation of food products linked to a territory is a long-term process. It often faces problems because of a lack of understanding of multilevel dynamics. This article aims at going deeper into institutional complementarity for achieving collective action for the production and valorisation of differentiated mountain cheeses in the province of Trento, in the Italian Alps. Based on the Ostrom's institutional approach, we conducted an historical analysis of the multilevel institutions (formal and informal). Results showed that there was a subsistence economy between 1800 and 1950, which led to little commitment from the producers to build up collective organisations. While incentives were given by the government and the church to improve production and create cooperatives. From 1950, "modernisation" of agriculture increased dramatically productivity and allowed production to be intended for the market. This enabled the development of nested cooperatives managed directly by the producers. Local dynamics got support from the province, to which autonomy was granted in 1948. From this period, we observe an increasing level of trust among the different local actors and toward the provincial government. From 2000, valorisation of cheese specificity became a central strategy on different levels to face competition, through the creation of labels and the development of agritourism. However, at the same time there has been an intensification of the production. This leads to a loss of the link between products and territory. The future challenges are then, for the producers, to implement innovative institutional arrangements that allow a sustainable differentiation of their products.

Key words: Collective Action; Institution; Specific Product; Mountain cheese; Province of Trento.

Introduction

Quality food products linked to a territory

Globalisation leads to development inequalities between the so-called favourable and marginal rural areas. On a generic market, the latter can hardly compete with favourable rural areas because they are generally less endowed with production factors, located far from the markets and often have unfavourable natural conditions for production-oriented agriculture (Colletis and Pecqueur, 2005). In addition, standardisation of food products results many times in the loss of traditional food. Rural mountain areas are particularly affected by these phenomena. However, in some marginal areas, local actors demonstrate capacity to redefine their development paths through quality differentiation of their food products as an alternative to productivity-based production (Allaire and Sylvander, 1997; Campagne and Pecqueur, 2014).

The differentiation process enables offering specific products, based on the identification and valorisation of the resources of the territory (Colletis and Pecqueur, 2005; Pecqueur, 2001). In the present article, territory is defined as a socially constructed, culturally marketed, and institutionally regulated space (Lopez and Muchnick, 1997). The product specificity mobilises both material attributes related to intrinsic qualities of the product and extrinsic attributes linked

to the geographical origin (e.g. culture, identity, landscapes) (Canada and Muchnik, 2011). This, therefore makes the production outside the territory impossible (Colletis and Pecqueur, 2005). The differentiation process offers a potential for self-organisation as it depends on the ability of the local actors to cooperate and act collectively (Torre and Vollet, 2016). It is built over the long term and results in a dynamic of collective learning both in terms of know-how and innovation (Colletis et al., 1999; Pecqueur, 2001). At the same time, it results from a specific demand for these products (Campagne and Pecqueur, 2014). Mollard (2001) highlighted the existence of a territorial quality rent (TQR), which corresponds to a higher price compared to a generic product, generated by the specificity of the product. The TQR is no longer based on the usual ratio of supply and demand but on a higher willingness to pay from consumers (Mollard, 2001; Pecqueur, 2001). Certification of the product specificity linked to a territory can be achieved either by implicit agreement when marketing is direct, or through an official geographical indication, particularly through the protected designation of origin (PDO) (Ditter and Brouard, 2012; Sylvander, 1997).

An institutional approach to study quality differentiation of food products linked to a territory

The institutional approach brings together a diverse set of schools of thought, which are interested in institutions and their impact on the coordination of economic actors (Ditter and Brouard, 2012). The present article is based on the institutional approach of Elinor Ostrom ("Nobel Prize" of economy). Ostrom has conducted numerous studies on self-organised communities managing Common Pool Resources (CPRs) (e.g. irrigation systems, fisheries, pastures and forests) to identify the conditions that allow a sustainable management (Ostrom, 1990). She contributed to the recognition of the institutional diversity of collective action outside public intervention or privatisation. In this sense, her approach is generally considered to be part of the new institutional economy (NIE). Nevertheless, her conception differs from the NIE by moving away from the standards of neoclassical analysis and the promotion of market solutions based on private property (Weinstein, 2013).

In fact, Ostrom gives a central place to rules and norms, as well as the institutional complementarity between the micro and macro scale, seen as determinant factors for ensuring long-term commitment and reducing opportunistic behaviours (Ostrom, 1990).

The first important aspect of Ostrom's institutionalism is the distinction between rule and norm, and the central place given to norms. In this sense, her approach is similar to the institutionalism of North (1990). Indeed, she rejected the conventional models of the rational individual. For her, the theory of bounded rationality, which corresponds to a norm-based human behaviour, is a better foundation for explaining collective action (Ostrom, 2007). The behavioural theory of human action indicates that "individuals pursue goals but do so subject to limited constraints of cognition and information processing, incomplete information, and the subtle influence of cultural predispositions and beliefs" (McGinnis, 2011). Ostrom (2011) defined institution as "shared understandings among those involved that refer to enforced prescriptions about what actions are required, prohibited, or permitted". They imply sanctions against those who do not conform (Crawford and Ostrom, 2005; Ostrom, 1990). Institutions can be considered in two forms: formal and informal. First, formal institutions are defined as a set of codified rules (e.g. constitutions, laws), including monitoring and sanctioning mechanisms (Ostrom, 2007). Second, informal institutions (i.e. social norms) are implicit and do not specify the sanctions in case of deviance. Individuals frequently internalise shared norms, in which non-conformity

involved both internal and external social costs (e.g. guilt, censorship) (Crawford et Ostrom, 1995). For Ostrom (2007), trust, defined as one individual's expectations of the behaviour of others, is an instrumental norm for successful collective action.

The second important dimension of Ostrom institutionalism is the multi-level analysis, which implies taking into account institutional complementarities between local arrangements and larger administrative environment. In fact, for Ostrom (1990) number of institutions can be constituted by local actors in a self-organising process rather than being imposed by external authorities. Nonetheless, institutions supplied by governments are also important in potentially dealing with collective action problems (Ostrom, 2007). Governments can have a positive influence to enhance the ability of local individuals to engage in effective institutional design, for example by facilitating access to information, by providing conflict resolution arenas or mechanisms to strengthen the sanctions and monitoring mechanisms supplied locally. They should at least recognise the legitimacy of local actors to put in place collective rules for self-organisation (Ostrom, 1990; 2000).

In this article, we will apply the Ostrom's institutional approach to study collective action for the differentiation of food products linked to a territory. More particularly, the study aims at going deeper into the dynamics of multi-level institutions, including formal and informal institutions, that allow the production and valorisation of quality mountain cheese, namely to know how institutions emerge, perpetuate and transform themselves along time. To our knowledge, there is still little research along this line. This study was conducted in the province of Trento, in the Italian Alps, where cheese production is an important economic activity. This case study was chosen because it presents long-enduring and multi-level institutions concerning organisation of cheese production and valorisation. To respond the objective, we realised a historical analysis from the beginning of the 19th century until today.

The contribution is structured as follows: The next section presents the study area. Then, the second section exposes the methods and the third part outlines the historical analysis. Last, the fourth section presents the conclusion.

Cheese production in the province of Trento

The Autonomous Province of Trento is located in the Alps of northern Italy (fig. 1). It covers an area of 6.200 km² and comprises 217 municipalities. Utilised agricultural area represents 1.400 km² and is predominantly characterised by meadows and pastures (81%), followed by orchards and vineyards (17%) and arable crops (2%) (ISTAT, 2010). Meadows for hay production, orchards and vineyards are located mainly in the valleys, whereas summer pastures are usually located above 1.500 m of altitude. According to the FBPT (2018), dairy cattle breeding is the main component of livestock sector in the province: of 1.400 farms, 800 are dairy farms.

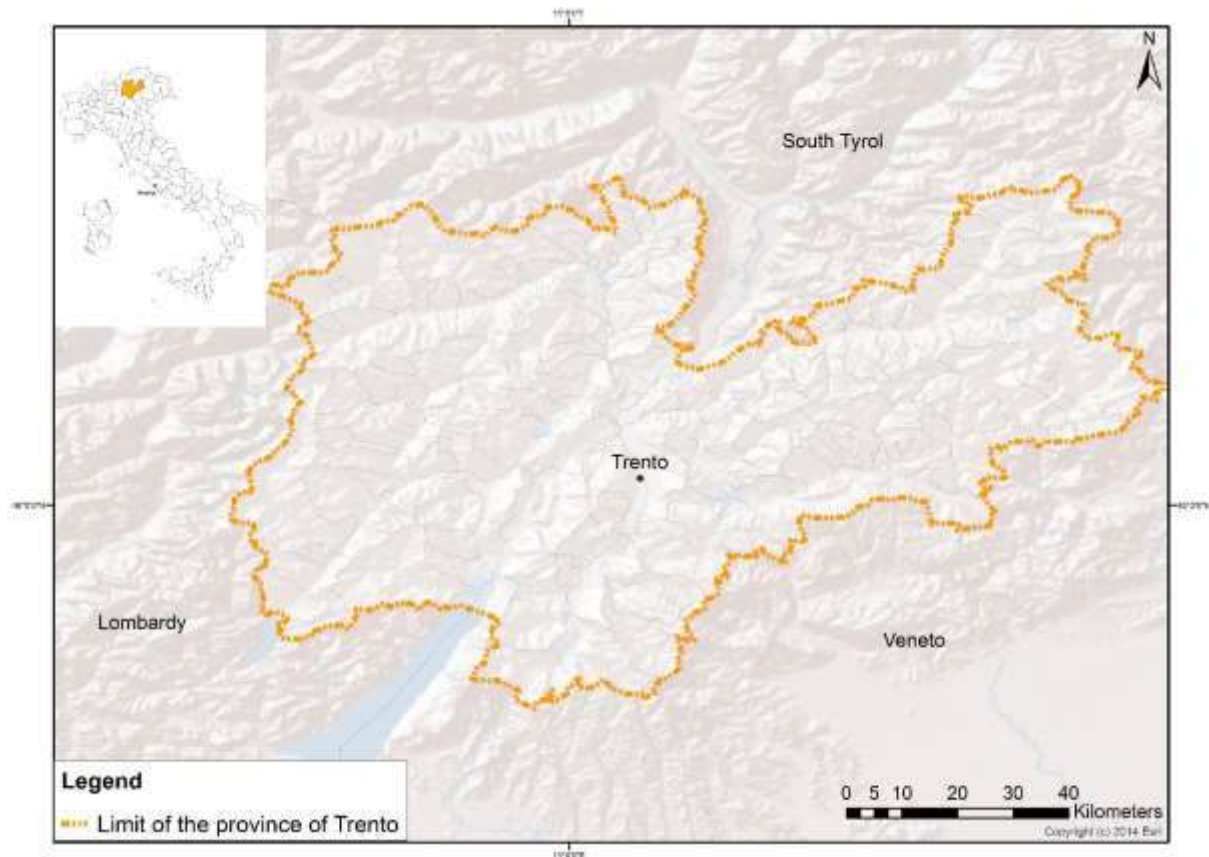


Fig. 1: Localisation of the province of Trento (source: own elaboration).

Dairy farming is strongly connected with dairy cooperatives, which produces typical cheeses (Concast, 2019). The 17 cooperatives are associated to the Concast-Trentingrana, the consortium of dairy cooperatives of the province, which ripens and sells the different cheeses that are not sold directly by the cooperatives (Dalpiaz, 2013). The main cheese produced is the Trentingrana, a row milk cheese of pressed cooked paste, which represents approximately 50% of the milk produced (Merz, 2011). Besides drinking milk and yogurt, the remaining part of milk is processed into other traditional cheeses made in different valleys (fig. 2).

Sturaro and al. (2013) distinguished four production systems concerning the dairy sector in the province:

- i) The first group is called “original traditional” and represents 50% of the dairy farms. The producers of this group use tie-stall, local breeds, move the lactating cows to summer pastures and use mainly hay and concentrate in winter.
- ii) The second group is also traditional. However, the producers do not move the lactating cows to summer pastures. They represent 25% of the dairy farms.
- iii) The third group is traditional using silage, which is not authorised for PDO cheese making. It represents 6% of the dairy farms. Half of them move the cows to summer pastures.
- iv) The intensive group represents 19% of the dairy farms. The producers use free stall, milking parlour and cosmopolitan breeds. Animal feed is rich in concentrates, imported from other areas. Two thirds of them use silage and many have adopted modern feeding techniques (i.e. unifeed). Most of the producers do not move the cows to summer pastures.

Methods

In the present article, both formal and informal institutions are analysed. Formal institutions, studied at both local and higher administrative levels (i.e. province, state and European levels), correspond to rules implemented to organise the production and the valorisation of the cheeses (e.g. public policies, legal frameworks, specifications, brands). Whereas informal institutions rely on the assessment of trust and are analysed at the local and provincial levels, i.e. among the actors involved in the production and valorisation and toward the provincial government. At the local level, we will focus on two kinds of trust, identified by Dupuy and Torre (2004). First, community trust binds individuals who share common characteristics (i.e. family, religious or ethnic). Second, organisational trust relies on commitments between individuals through repeated and face-to-face situations and/or internal rules.

Information was first collected through semi-structured interviews with key actors during a session of fieldwork carried out in summer 2019. The selected actors are part of the different organisations of the province involved in the value chain. Their consultation was instrumental to understand better the emergence, evolution and actual functioning of the organisations, as well as the activities conducted and the rules implemented for cheese production and valorisation. In addition, the interviews enabled to assess qualitatively trust between the different local actors, including the producers. Interviews were conducted with two technicians of the Edmund Mach Foundation (EMF) , one inspection veterinarian, the director and ex-director of the Federation of Breeders of the Province of Trento (FBPT) , the director and the laboratory responsible of the Concast-Trentingrana consortium, the director and the secretary of the Primiero cooperative and the director of one cooperative promoting tourism (A.P.T. San Martino di Castrozza) (table 1).

Table 1: Composition of the interviews conducted with key actors.

Organisation	Interviewed persons	Content of the interview
Edmund Mach Foundation (EMF)	Two technicians (interviewed together)	History of the organisation (e.g. creation, evolution) Actual structure and staff Activities and projects conducted Relationships with the other local actors, including the producers (meeting frequency and subject, level of trust)
Federation of Breeders of the Province of Trento (FBPT)	The director and ex-director (interviewed separately)	History of the organisation (e.g. creation, evolution) Actual structure and staff Member number Activities and projects conducted Specifications or other internal rules Relationships with the other local actors (meeting frequency and subject, level of trust)
Inspection services	One veterinarian	History (e.g. creation, evolution) Actual structure and staff Activities conducted Sanitary norms Relation with the producers (level of trust, frequency of meeting and subjects)
Concast-Trentingrana consortium	The director and the laboratory responsible	History (e.g. creation, evolution) Actual structure and staff Activities and projects conducted Frequency of meetings (i.e. general assembly)

	(interviewed separately)	Technical aspects (production type and size, storage, marketing) Specifications and internal production rules Accounting sheet Characteristics of each cooperative (e.g. number of members, production type and size, predominant production systems) Relationships among the cooperatives and with the other actors involved (e.g. trust, conflicts)
Primiero cooperative	The director and the secretary (interviewed separately)	History (e.g. creation, evolution) Actual structure and staff Member number Activities and projects conducted Accountable sheet Production characteristics (quantity, technical aspect, predominant production systems) Specification and internal rules of production Relationships among the producer members and with the other organisations involved (e.g. trust, conflicts)
Cooperative promoting tourism (A.P.T. San Martino di Castrozza)	The director	History (e.g. creation, evolution) Actual structure and staff Members number and who are they Activities and projects conducted Brands, labels Relationships with the actors involved in tourist projects (i.e. trust level)

Second, historical and scientific literatures about the province and the cheese production were consulted, as narrative, theses and articles (e.g. Bond, 2001; Dalpiaz, 2013; Sturaro et al., 2013). Legal documents, as laws, regulations and specifications, were also examined in order to analyse formal institutions at local and higher administrative levels along time (i.e. cooperative, provincial, state and European levels).

Third, to complete and deepen the literature review and the interviews, semi-structured historical interviews (farm biographies) were conducted with four families of producer members of the Primiero cooperative to get details about the history of their properties since the nineteenth century and the evolution of the production systems and the organisation of the cheese production from the 20th century until today (table 2). The Primiero cooperative was chosen because it is part of a wider investigation, integrating a social network analysis of advice among the members (45 producers) and an analysis of trust and conflict among members and between members and the other actors involved in the value chain (Pachoud et al., 2020). On the one hand, the farm biographies will support the results obtained from the literature review and the previous interviews. In fact, production systems and rural ways of life were very similar in the province during the 19th and 20th century (Bond, 2001; Dalpiaz, 2013). While on the other hand, it will deepen the socio-historical dynamics on a micro scale in order to have a more detailed understanding. The four family members were chosen because they are members of the cooperative since its creation and the father of the family 4 was one of the founders.

Table 2: Characteristics of the four interviewed families for the farm biography.

Farm	Member of the family present for the interview	Implication on the farm (% working time)	Age	Farm type	Family workforce (number of people working)	Number of lactating cows	Meadow area (ha)	Milk production (qt/year)	Member of the board of directors
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				on the farm)					
1	Father	100%	56	Intensive	2	29	30	1717	President
2	Mother and father (interviewed together)	Mother: occasional help ¹ Father: 100%	59 and 60	Original traditional	1 + occasional help	24	23	1433	No
3	Mother	100%	76	Original traditional	2	3	7	108	No
4	Father and son (interviewed separately)	Father: 50% Son: 100%	50 and 81	Original traditional	2,5	20	24	740	Son: adviser

¹ She is secretary of the cooperative and was interviewed twice (for the semi-structured interview with key actors and for the farm biography).

The institutional analysis allowed to distinguish three periods of time. The first one between 1800 and 1950 was analysed by means of the historical literature review and the farm biographies. The second one between 1950 and 2000 and the third one between 2000 and today were analysed through literature (historical, scientific and legal documents), semi-structured interviews with the actors of the different organisations and the farm biographies.

Results

The historical analysis of the cheese production in the province of Trento was divided into three periods of time that will be presented successively: i) from 1800 to 1950, a subsistence economy based on turn system dairies; ii) from 1950 to 2000, “modernisation” of the agriculture and creation of dairy cooperatives; iii) from 2000 until today, quality enforcement and intensification issues.

1800-1950: subsistence economy

Political and economic context

The county of Tyrol, which was under Austrian sovereignty of the Habsburgs, annexed the province of Trento in 1816. The authority of the Prince-Bishopric, who were in power since the 11th century, thus ended. The Counts of Tyrol have tended to favour the development of peasant property, exempting them from feudal burdens (Giardina et al., 1993). The government constituted district agricultural consortia that were headed by the provincial council of agriculture. The consortia had a role in advice and education to the farmers. It also created an agricultural school with an experimental station at San Michele all'Adige in 1874. The school was important for advising the farmers and the improvement of the quality of the dairy products (Piccinini, 1960). These institutional changes allowed increasing trust between peasants and the government (Bond, 2001). At the same time, there was a high community trust between the peasants because they have stayed in communities for generations (Casari, 2007).

The land ownership was affected by the particular mountain morphology. It is characterised by the dualistic presence of small fragmented properties and collective pastures and forests. Small fragmented properties, due to the heritage system, were located in the valleys and low mountain areas. They were intended for cultivation. While pastures and forests, managed collectively by the families and regulated by administrative laws, were found on higher altitudes. Collective management of alpine pastures and forests has favoured a previous culture of cooperation among the producers (Casari, 2007; Casari et al., 2019). Production of cereals (wheat, rye, barley, maize and buckwheat), horticulture, sowing for textiles (hemp, linen) and milk products

aimed at self-consumption. While crops intended for the market mainly concerned the cultivation of the mulberry for the silkworm, viticulture and fruit trees. However, due to the isolation and low productivity, it was more subsistence agriculture (Cafaro, 1998).

Difficulties of the agricultural sector

Traditionally, the cows were moved to highland pastures during summer. In 1900, there were around 600 summer farms. One cheesemaker was present on each farm to process the milk (Battisti, 1904). This organisation is still the same today. However, during this period, there were significant structural deficiencies. There was a lack of care of the pastures and stables for cattle, as well as a lack of hygiene during milking and cheese making. Over the century, the council had launched a program with subsidies for the improvement of pastures, education in accounting and of the cheesemakers (Oliva, 1920).

The rest of the year on the valley bottoms, the fragmentation of the property and the reduced number of animals (average of 2,6 per farm) resulted in low milk productivity (Zaninelli, 1978). Moreover, the animals were often malnourished because of the limit of forage availability. The meadows were sacrificed in favour of other cultures. Last, little attention was given to the stables, which led to hygiene deficiencies during milking.

In addition, a series of natural events exacerbated the situation, such as pellagra and epidemics, which strongly affected the cultivation of the vine (odium) and silkworm (pebrine) but also potatoes and cattle. Violent floods also took place in 1882 and 1885. Consequently, the peasants of the province emigrated to tens of thousands to other parts of Europe or to America, especially to Brazil (Dalpiaz, 2013).

Organisation of the cheese production

During the 19th century, several dairies based on the turn system developed in winter for self-consumption (Leonardi, 1982). These dairies gathered a group of breeders who pooled their milk every day. A turn corresponds to a certain number of days, proportional to the farm production, during which a breeder gets the cheese production. A cheesemaker took over the processing. The producer of the turn gave his help to the cheesemaker and paid him, realised the maturation and paid the fees to cover general expenses of the dairy. If a part exceeded the self-consumption, it was intended for the local market. This system allowed to better overcome the small quantities of the own processing (Bond, 2001).

“Modernisation” was supported by the provincial council, which realised training courses for cheesemakers and increased quality control. Also, the council organised fairs and exhibitions to raise awareness of the problems (Gilberti, 1920). Furthermore, it supported organisational change of the dairies into cooperatives. However, this first required to increase production and reduce self-consumption. The fragmentation of the dairies and the low productivity of the farms were the main causes of the poor production of dairies. Moreover, the difficulties of transport and parochialism put the brakes on mergers between dairies (Gilberti, 1914). In 1901, there were about 300 social dairies based on this turn system (Battisti, 1904).

Development of cooperatives

The origin of the cooperatives is rooted in the Catholic Church. In addition, the Austro-Hungarian government, with the law on economic consortiums of 1873, gave a great impetus to the birth and development of cooperatives (Bond, 2001). The first consumer cooperative,

founded in 1890, ensured the supply of basic goods at lower prices and more efficient organisation for the sale of local products. Two years later, in 1892, the first rural fund was created to facilitate access to credit (Dalpiaz, 2013). In 1895, there were 50 cooperatives, of which 28 consumer cooperatives and 13 rural funds (Leonardi, 1982). The federation of the cooperation was founded in 1895 with the tasks of promotion, coordination, assistance and review of balance sheets. However, the first dairy cooperative was only created in 1909. Their number grew up slowly in comparison with rural funds and consumer cooperatives, as it required to overcome self-consumption. The provincial council of agriculture promoted the spread of dairy cooperatives with the clergy, requesting funding from the Diet of Innsbruck to provide assistance and subsidies (Piccinini, 1960).

In 1918, at the end of the First World War, the province was annexed by the Kingdom of Italy. Cooperatives were then part of a new legislative context. However, they continued to grow: there were 269 cooperatives in 1920. Nevertheless, the advent of fascism led to the abandonment of self-government and to strong centralisation. During that period, the federation of the cooperation was abolished. Technical assistance was conducted by the technicians of the ambulatory chair of agriculture of Trento and still by the School of San Michele all'Adige (Dalpiaz, 2013). An attempt was made to “modernise” agriculture, mainly by replacing local breeds (Rendena) with more productive breeds (Simmental). They also tried to develop new technologies for cheese making especially through the foundation in 1921 of a dairy school at San Michele all'Adige. Moreover, in 1929, the summer farm Juribello was founded, which aimed at creating a summer school for shepherds to improve the management of summer farms (APT, 2010). The fascist government tended to reduce the number of dairies and to reorganise them into cooperatives. However, in the beginning, there was a low convenience from the breeders to the adoption of more complex structures and turn system dairies based on base on a high community trust that still prevailed (Bond, 2001).

1950 – 2000: “modernisation” of agriculture and organisation of the production in cooperatives

Grant of the province’s autonomy and economic context

The autonomy of the province of Trento was granted in 1948. At that time, the autonomy concerned the sectors of agriculture, tourism, handicrafts, credit and the development and supervision of cooperatives. The federation of the cooperation was reconstituted and the autonomy gave it renewed impetus. Over the decades, the autonomy was gradually extended to almost all the competencies of a nation-state, with the exception of justice and foreign affairs.

The years following the Second World War were also marked by a great economic transformation in the province. From a local economy concentrated on agriculture, the industrial and tertiary sectors became important. This led to the exit of the agricultural sector from a large number of people. 40% of the population was occupied in agriculture in 1951; this proportion fell to 14% in 1971. This phenomenon increased the depopulation in the upper mountain areas and the abandonment of breeding activity, especially by young people (Bond, 2001).

“Modernisation” of the livestock sector

Since the 1960s, we observed an important “modernisation” of the livestock sector. The number of breeders and dairy cattle were constantly decreasing while production remained

relatively stable between 1950 and 2010 and then increased in the last years (table 3). This has been due to an increased specialisation of breeders, mechanisation (i.e. milking parlour, tractors) and genetics (improvement of local breeds and arrival of highly productive breeds such as Holstein). Genetic selection enabled a noteworthy increase in productivity; for example, the productivity doubled between 1961 and 1994, passing from 2.269 to 4.503 kg/cow/year (Bond, 2001). In 1957, producers created the FBPT to manage the herd book of the different breeds (Dalpiaz, 2013).

Table 3: Evolution of milk production, of dairy, member and cow number, and milk productivity between 1951 and 2018 (source: APT, 2010; FBPT, 2018; Concast, 2019).

	1951	1961	1971	1981	1994	2000	2010	2018
Total milk production (T)	122.000	118.000	105.000	110.000	117.519	114.300	118.000	151.955
Conferred milk to dairies (T)	65.000	62.000	61.000	65.000	93.768	102.870	106.200	119.762
Dairy cooperatives	55	98	81	51	30	22	18	17
Turn system dairies	200	120	44	16	1	1	1	1
Member number	15.000	9.500	5.700	4.900	2.900	1.515	791	729
Cow number	60.000	52.000	37.200	35.000	26.100	25.500	25.040	24.500
Productivity (kg milk/cow/year)	2.033	2.269	2.823	3.143	4.503	4.482	4.713	6.202

Furthermore, there was an improvement in milk quality through better management of meadows and pastures, which also increased cow productivity. Stables were improved as well as milking practices. In the province, such progress was supported by provincial technical assistance and research (e.g. San Michele all'Adige, University of Trento and Padua) (Dalpiaz, 2013).

“Modernisation” allowed the passage from subsistence and fragmented farms to an activity specialised in larger units and intended for the market. This led to the closure of small farms. This process favoured the widespread diffusion of dairy cooperatives. The province gave economic support to dairies to incentive the conversion toward cooperatives. Cooperatives allowed then to aggregate transformation and marketing functions. In addition, its dimension allows the processing of a higher quantity of milk and professional cheesemakers enabled technical improvement in processing and maturation. Last, their dimension gave a higher bargaining power; it became then easier to find markets and to sell at higher prices (Bond, 2001). From the 1960s until today, there have been numerous merger operations in order to improve rationality (Dalpiaz, 2013). The development of dairy cooperatives allowed the emergence and strengthening of organisational trust among producers who came from different communities. Moreover, the role of support of the province and the proximity relationships with the local populations allowed strengthening trust among them.

Organisation of cheese production in cooperatives

In order to coordinate and strengthen the dairy sector, a second-level cooperative, called Consortium of social dairies and milk producers of the province of Trento (Concast), was created in 1951 at Trento. It has a role in technical assistance to cheesemakers and dairies. The first major initiative was the acquisition of a laboratory for milk analysis in 1970. From 1972, the payment according to the milk quality was introduced, with monthly withdrawals on each farm to determine the analytical parameters. Controls on compliance with health and hygiene

regulations for milk and cheese production was carried out by the provincial veterinary services (Dalpiaz, 2013).

After the Second World War, the production of Trentingrana developed in the entire province. Production was no longer seasonal whereas all year round. In 1965, the Trentingrana joined the consortium of the Grana Padano cheese. However, due to the different production conditions (silage-free feeds, mountain areas, etc.), the consortium Trentingrana was created in 1973 at Segno with the aim of managing independently the production and promotion (e.g. exhibitions, competitions, advertisements). In 1987, the Italian government approved the PDO certification. In 1988, the conferment of all the Trentingrana produced in cooperatives to the consortium became mandatory, excluding the ones sold directly in the dairies. The total conferment of the other traditional cheeses to the consortium was established only in 2004.

In 1993, in order to have a harmonised management, the two consortia merged under the unique consortium Concast-Trentingrana. The actions carried out are technical assistance to dairies and cheesemakers; development of consortium regulations and control of their application in dairies and farms; milk and cheese analyses in the laboratory and payment according to their quality. It also realises the maturation and commercialisation of cheese under the branch gruppo formaggi del Trentino. The consortium also produces and sells butter since 1992 and milk powder since 1993. Promotion is carried out by the consortium, as well as research projects in collaboration with universities (Dalpiaz, 2013). Last, in 1990 and then in 2001 the consortium developed specifications for the production of milk containing all aspects relating to the production of milk and the feeding of cows (e.g. feeding without silage and GMOs).

From the 2000s: how to conciliate quality valorisation and production intensification

Organisation of the cheese production today

In the province of Trento, there are 17 dairies associated to the Concast-Trentingrana consortium. Approximately 80% of the total milk (120.000 tons a year) produced in the province is processed by these cooperatives, which regroup 729 milk producers (91% of the total number of the milk producers of the province). The cooperatives associated with the consortium give a better revenue to the producers compared to the average national revenue: the price of one-litter milk was around €0,58 in 2018, compared to €0,37 in Lombardy (national reference) (Concast, 2019).

In addition, the FBPT, the veterinary inspection services and the EMF are important actors who committed to cheese valorisation at the provincial level. They often work together to implement projects to improve cheese quality (e.g. improvement of meadows and pastures, and sanitary quality of milk). Also, the federation of the cooperation still plays an important role as representation, assistance, protection and review of the balance sheets of the cooperatives of the province. These actors enjoy a high level of trust from the producers (Pachoud et al., 2020).

Intensification of the milk production

During the last decades, there was a decline in traditional extensive livestock systems. In general, there was an abandonment of mountain pastures, especially the steepest mountain areas. Between 2000 and 2018, there was a reduction of 4,5% in meadows and pastures (ISTAT, 2018). Intensification took place in the valleys, which are more disposed to mechanisation, where meadows are used intensively (several cuts per season) or transformed into annual or permanent croplands. There has been an expansion of intensive permanent crops

(vineyards and fruit trees). Vineyards, for example, increased by 11,8% between 2000 and 2018 (ISTAT, 2018). In parallel, between 2000 and 2018, dairy farms decreased from 1.800 to 800 and the average herd size increased from 13,2 to 30,6 cows per farm (FBPT, 2018; ISTAT, 2018).

Milk production and the number of members per cooperative differ widely from one cooperative to another (fig. 2). Latte Trento became the largest cooperative (40% of the milk produced) after performing many mergers (Dalpiaz, 2013). This cooperative produces mainly pasteurized drinking milk, but also butter, yogurt and cheese. It commercialises all their products under its own brand Latte Trento, except for the Trentingrana, which is conferred in totality to the consortium. Moreover, in some valleys, the farms became more intensive. They use technical innovations (e.g. unifeed, free stalls), cosmopolitan breeds and abandoned mostly the use of summer pastures. Higher productivity is observed in the cooperative of Cavareno and Romeno (Non Valley), Latte Trento (Valsugana), Tovel (Guidicarie Valley) and Predazzo and Moena (Fiemme Valley). The level of production among members of the same cooperative can also differ substantially. For example, within the cooperative of Primiero, the largest producer produces 300 T/year of milk, whereas the smallest one produces 11 T/year. Although it was shown that trust among members is high, the intensification phenomenon led to increasing conflicts among “traditional” and “intensive” producers (Pachoud et al., 2020).

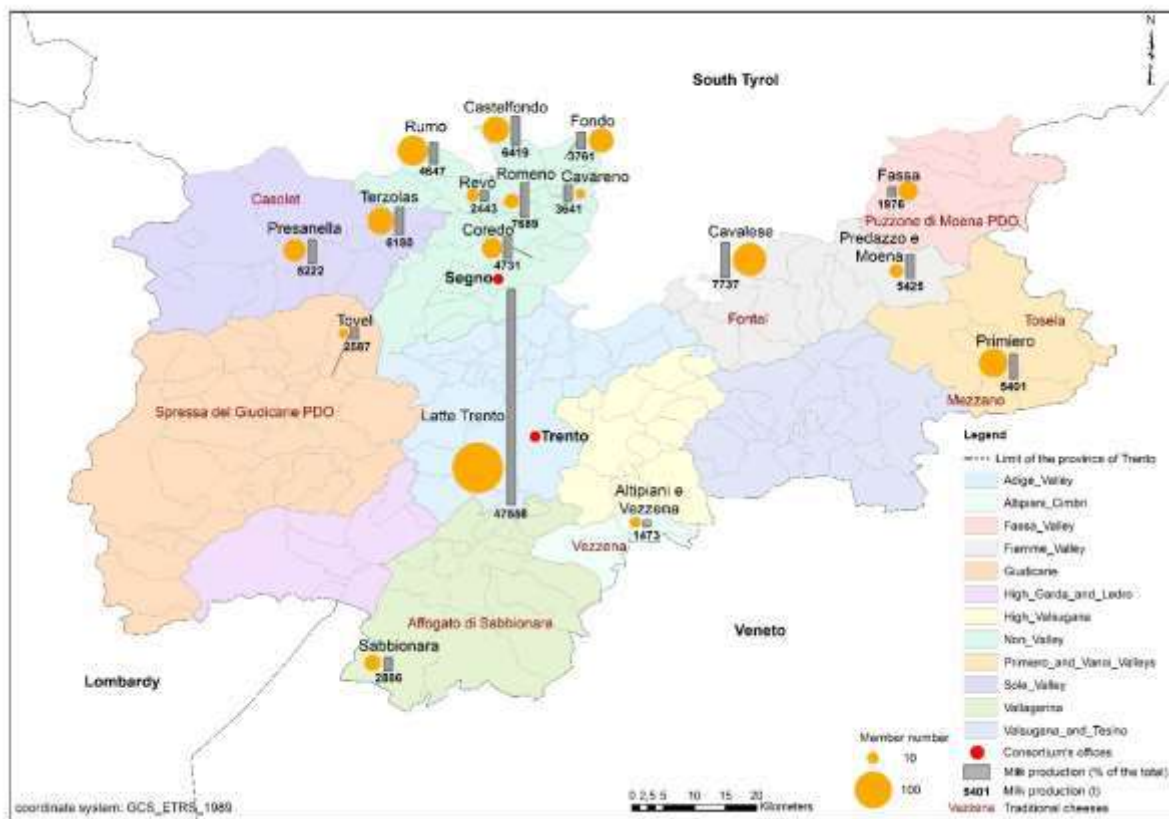


Fig. 2: Localisation of the dairy cooperatives in the province of Trento and share of milk conferred to the consortium and member number per cooperative in 2018 (source: own elaboration).

Today, there are 305 summer farms. Only half of them are intended for lactating cows and host about 11.500 cows (47% of the total). The other half of the summer farms graze with late lactating cows or heifers (FBPT, 2018).

Valorisation of the cheese quality

The milk produced on the mountain pastures was around 9.000 T/year in 2018 (6% of the production). The transformation of milk on alpine pastures is carried out in about 90 summer farms and represents only 2.000 tons of milk. The main part is brought to the dairies in the valleys and the cheese is marketed under the brand Sapori di Malga, created in 2008. For the Trentingrana, the number of cheeses marketed by the consortium is about 500 per year out of the approximately 101.000 sold annually. The other traditional cheeses represent about 4% of total production. According to the consortium, this is supposed to increase in the next years.

In addition to the brands developed by the consortium, other tools were recently used to valorise the quality of the cheese. First, the PDO framework (n°2081/92) of the European Union legislation is an instrumental regulation to protect the cheese, through a label that links the quality of the products to its origin. The Trentingrana, Spessa delle Giudicarie and Puzzone di Moena obtained the PDO certification, respectively in 1987, 2002 and 2014. Second, the Slow Food Presidium, delivered by the Slow Food foundation created in 2003, aims at sustaining quality production at risk of extinction, recovering traditional processing methods and safeguarding local breeds. The Trentingrana, Puzzone di Moena, Casòlet and Vezzena received the presidium. Also, the brand qualità Trentino, created in 2009 and managed by the province, is an indication of origin, which aims at communicating and identifying the quality of the food products made in the province.

In the last two decades in the province, gastronomic tourism for the discovery of local products, mainly cheese, greatly increased. In 2017, 671 farms of the province practiced agritourist activities, it means an increase of 14% compared to 2016 (ISTAT, 2018). On alpine pastures, around 30 summer farms practice agritourist activities (i.e. accommodation, restoration and degustation). The province developed the brand Agritur Trentino that is a tourism offer of rural structures to taste local products and to assist or participate in their fabrication. Moreover, 14 tourism entities spread in the different municipalities, coordinate, organise and promote events for tourists. They work in collaboration with cooperatives or nature parks (e.g. Park Paneveggio Pale di San Martino). Many events are related to the discovery of local dairy products. For example, Latte in Festa allows tasting diverse dairy products made on summer farms. Albe in malga gives tourists the opportunity to go on summer farms to participate in the morning milking.

To summarise, fig. 3 presents the formal institutions devised at the different administrative levels (i.e. provincial, national and European) and the formal and informal (i.e. trust) institutions at the local level for the three defined periods. This figure shows that institutions aiming at the organisation of cheese production and valorisation in the province of Trento developed and strengthened between the different levels over time. The development of formal institutions was facilitated by increasing organisational trust among the local actors, especially among the producers, and trust toward the provincial government, which has given crucial support to localised collective action.

	1800-1950: Subsistence economy	1950-2000: "modernization" of agriculture and cooperative organisation	From the 2000s: quality enforcement and intensification
Formal institutions	Administrative levels Agricultural and rural development policies (e.g. subsidies) Peasant property facilitation Collective management of alpine pastures Local level Turn system dairies	Administrative levels Agricultural and rural development policies (e.g. subsidies) Province autonomy PDO framework Hygiene policy Provincial Nature Park Collective management of alpine pastures Local level Dairy cooperatives and consortium Payment to milk quality Total conferment of milk and cheese Milk production specification (<i>gruppo formaggi del Trentino</i>) Herd book specification	Administrative levels Agricultural and rural development policies (e.g. subsidies) Province autonomy PDO framework Hygiene policy Provincial Nature Park Slow food presidia Production specification (<i>Qualità Trentino</i>) Tourism development policy (e.g. <i>Agritur Trentino</i>) Collective management of alpine pastures Local level Dairy cooperatives and consortium Payment to milk quality Total conferment of milk and cheese Milk production specification (<i>gruppo formaggi del Trentino</i>) Herd book specification Milk quotas Valorisation policy (e.g. <i>Sapori di Malga</i> , tourist events)
Community trust		+	+
Organisational trust	-	+	++
Trust toward the provincial government	+	++	++

Fig. 3: Institutions devised at the administrative and local levels for cheese production and valorisation in the province of Trento for the three defined periods (source: own elaboration).

Conclusion

In the province of Trento, during the 19th century, most of the agricultural production units were of very small dimensions. The limited production was used to cover the family's needs. In this context, the establishment of dairy cooperatives did not happen, as it requires the development of the market. Thus, the dairies based on a turn system of small dimension and operating eight months a year remained the prevalent structure until the middle of the 20th century. "Modernisation", from the 1960s, allowed the progressive passage of an activity oriented to family self-consumption to industrial processing in cooperatives intended for the market. The cooperative organisation gradually expanded from processing to ripening and from local to national and international marketing of cheese, passing through quality valorisation. At the same time, there is an increasing interest from the consumers toward quality products linked to their origin.

Collective action for cheese production and valorisation was enabled by the implementation of multi-level institutions over time. First, at the local level (cooperatives and consortium), the implementation of institutional arrangements by the producers themselves demonstrated their high capacity of self-organisation. Many operational rules were defined to improve organisation and valorisation of the products (e.g. total conferment of the milk and cheese, specifications for milk production, payment to quality). These rules do not only explicit ways of doing, but also provide monitoring systems and sanctions in case of noncompliance. Along time, trust among producers consolidated and expended, passing from community to organisational trust, which appears crucial for the success of collective action and the development of cooperatives. Moreover, collective management of alpine pastures gave the foundation of a previous culture of cooperation. Second, at higher levels, governments since the Austrian empire gave an instrumental support to agriculture modernisation and cooperatives through the implementation of laws, and financial and technical support. They also facilitated the process of cheese valorisation (e.g. labels). In this respect, the provincial

autonomy granted in 1948 played a central role. The government has enjoyed a high level of trust from the local actors. In comparison, similar research conducted on the Serrano cheese in southern Brazil showed that a lack of policies to regulate cheese production, a top-down model from the extension agents to the producers to implement cheese valorisation projects, as well as a lack of trust among producers and toward governments lead to collective action failures (Pachoud et al., 2019).

However, we observe an acceleration of production intensification in the province, and therefore a loss in the link between product, identity and territory. Moreover, the end of milk quotas at the European level in 2015 exacerbated this tendency. Today, producers depend more on imported feed and cosmopolitan breeds and many have abandoned the use of summer pastures. This can be seen as antithetical with the strategies implemented for the quality valorisation. As a result, farm productivity increased dramatically in the last decades. Nonetheless, intensification does not happen everywhere: there are different production levels between producers of different valleys but also among members of the same cooperative. This led to increasing conflicts between “traditional” and “intensive” producers (Pachoud et al., 2020). Thus, the implementation of institutional arrangements at the consortium and cooperative levels appear instrumental to limit the conflicts, control the intensification and strengthen the cheese quality, and therefore its market value. In this sense, the cooperative of Primiero decided in 2018 to implement their own milk quotas to control production and introduced monitoring and sanctioning systems.

In sum, the transformation of the province of Trento from a marginal and poor territory into one of the richest in Europe depended greatly on institutional complementarity between the local and higher administrative levels. This process requires therefore long-term commitment at the different scales, trust among the different actors and a creative force of the local actors to implement innovative arrangements in order to adapt to constant changes.

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Collective action in Localized Agrifood Systems: An analysis by the social networks and the proximities. Study of a Serrano cheese producers' association in the Campos de Cima da Serra/Brazil

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ABSTRACT

Collective action within territorial organizations is complex. Initiatives often collapse from a lack of understanding of relational dynamics and logics of action. This article proposes a relational approach to study the collective action process within a producer association of a Localized Agrifood System (LAS). We conducted the research within the APROCAMPOS association, located in the Serrano cheese LAS, which involves producer families, extension agents, inspection veterinarians and secretaries of agriculture. We first conducted a social network analysis of advice seeking within the association, through sociometric interviews with the producer members. Second, an analysis of territorial proximity, conducted through semi-structured interviews with the association participants, was combined with the social network analysis. Results showed that extension agents are in a very central position in the advice network. They follow a classical top down model of knowledge diffusion. The president of the association plays a key brokerage role, essential for the network cohesion and information flow. Second, the analyses revealed a lack of trust and reciprocity among producers, leading to a low level of interaction and collective action, which can, however, be improved by the combination of geographical and organized proximities. In sum, the top-down model leads to low levels of initiative and participation among the producers in collective action. Local knowledge needs to be integrated in a more participatory governance frame to build common projects of cheese valorization. Nonetheless, institutional arrangements appear instrumental to define political orientation that favors cooperation and meets the quality of the Serrano cheese and promotes the development of the territory as a whole.

1. Introduction

Globalized and production-oriented agriculture often leads to spatial inequalities and the exclusion of peripheral rural regions (Torre and Vollet, 2016). Rural mountain regions, where cheese value chains are significant, are particularly affected by this phenomenon. Indeed, rural mountain areas are usually with poorly developed infrastructures, difficult to access and far away from political decision-making. These areas can hardly compete with urban and more developed rural regions concerning generic resources (i.e. labor, wages and infrastructures) (Colletis and Pecqueur, 2004). However, globalization offers new paths of development for these territories through endogenous development based on local resources, local cultures and identity, in order to propose specific and differentiated goods and services (Pecqueur, 2001). This process depends on the ability of the local actors to act collectively to

valorize the resources of the territory (Torre and Vollet, 2016).

Today we observe a growing interest in the concept of Localized Agrifood Systems (LAS), inspired by researches of regional science on local productive systems and by researches on sign of quality (Muchnik et al., 2007). The notion of LAS defines a type of organization of agrifood activities, which are productive and also have social and cultural dimensions (Muchnik, 1996). Territorial dynamics in LAS play a decisive role in the development of production activities and in the coordination that associates heterogeneous actors intervening directly or indirectly in these activities (Muchnik, 2009). LAS build on the links between humans, territory and products (Fournie, 2016). Although the spatial proximity between the actors of LAS favor exchanges, it is not the only determining element. Indeed, the organization capacities are also favored by the organized proximity. Organized proximity refers to either a belonging logic to networks of more or less formal relations, or

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to a similarity logic that corresponds to mental adherence of common categories (Torre and Beuret, 2012; Torre and Rallet, 2005). Organized proximity includes dimensions of social capital (i.e. bonding and linking social capital, trust) (Angeon et al., 2006; Putnam, 1993, 2000; Woolcock, 1998). Nonetheless, geographical proximity provides a framework for integrating space into interactions, which makes the approach by the proximities more interesting for our study (Polge, 2015).

The aim of our study is to propose a relational approach among members of a producer association within a LAS to grasp the construction processes of collective action. In this study, we define collective action as “the action taken by a group (either directly or on its behalf through an organization) in pursuit of members’ perceived shared interests” (Marshall, 1998). According to Lazega (2006), the capacity of collective action relies on relational structures, which require the exchange of resources. Here, advice is of particular importance. Our study is part of the research carried out on organizational processes and dynamics that accompany the implementation of territorial food governance. This kind of governance refers to forms of coordination allowing the various food actors of a territory, understood as “a developed space, socially constructed, culturally influenced and institutionally regulated” (Lopez and Muchnik, 1997), to take part in collective action promoting territorial resources (Fournie, 2016). Some rural studies associated the social network approach with the proximity analysis. This was the case in situations of dynamics of changes and innovation, i.e. among cereal growers in Burgundy reducing use of phytosanitary products (Compagnone and Hellec, 2015), among banana growers in Guadeloupe implementing agroecological practices (Houdart et al., 2011) or among dairy producers in Brazilian Amazon region in a context of environmental and technical pressure (Torre et al., 2018). Other rural studies apply these two frameworks to analyze local processes of economic development in Brazilian Amazon (Polge et al., 2016), or to study the relationship between individuals’ dwelling unit locations and their kinship relations in Thailand (Verdery et al., 2012). The present article will complement this research, using both frameworks to enrich the reflections on collective action in LAS, more specifically focusing on the interactions between different actors (producers, extension agents, inspection veterinarians and local authority) within a collective organization, who committed to a process of defense and certification of a traditional mountain cheese in southern Brazil.

This study has been conducted in the Campos de Cima da Serra in southern Brazil, which presents low development indices, is isolated from large urban centers and has undeveloped transport and telecommunication networks (IBGE, 2018). This region holds the artisanal Serrano cheese value chain, a traditional mountain cheese value chain. The Serrano cheese, a raw milk cheese, is produced by family farms, with parents and their children on the farm. The value chain is a structuring element for the territory, because of its economic importance. In return, the territory exerts a strong influence on the actors of the value chain (marked identity, sense of belonging, cultural manifestations) which condition their practices and representations (Cruz, 2012). Today, we observe an important increase in demand of consumers for Serrano Cheese (Ambrosini, 2007) especially for young cheese of less than thirty days of maturation. However, this chain remains informal and cheese sales have become illegal. Indeed, this product does not meet the sanitary standards for raw milk cheese because the Brazilian legal framework does not authorize the selling of raw milk cheese with less than sixty days of maturation. Also, national hygiene standards, adapted to big dairy industries, are incompatible with the reality of small-scale and artisanal production. Nonetheless, the first forms of collective action emerged the last decade in the region through the creation of four producer associations. Their objective is to act for the defense and the valorization of the Serrano cheese. In this study, we will focus on the APROCAMPOS association which is located in the municipalities of São José dos Ausentes and Bom Jesus and involves forty-seven producer families (nuclear family units living on the same farm), five extension agents, two inspection veterinarians and two

secretaries of agriculture. This was the first association of Serrano cheese producers created in 2010 and it is today the most active one, with many activities undertaken (Ries et al., 2014).

In the context of informality of the Serrano value chain, it appears interesting to study collective dynamics among the actors of the association APROCAMPOS. For that, two theoretical analysis frameworks were combined:

- First, a social network approach seeks to understand how patterns of interactions among actors frame collective action in the association (Lazega, 2014). Additionally, the social network approach gives information on the role of each actor in the network and enables to see if some actors have more influence on collective action (Crona et al., 2011), particularly in terms of status. Here, two types of status are considered, the formal status in terms of formal position identified by higher socio-economic attributes (i.e. education, revenue), and the informal status which reflect the position of the individual in the network in terms of indegree centrality (number of advice request received) (Lazega et al., 2012). We will describe the advice network concerning farming and cheese making matters, thanks to data collected through sociometric interviews based on the roster method with the producer members of the association (Wasserman and Faust, 1994). For that, we showed the roster of all the actors involved in the association to forty-six of the forty-seven producer members so that they cite the names to whom they seek advice. We only asked the producers and not the other participants (extension agents, inspection veterinarians and agricultural secretaries) because advice seeking on farming and cheese making matters concern above all producers. We consider both the formal advice network as the advices given by state institutions (i.e. extension services) and the informal advice network as the exchange of advice and information between peers (Isaac et al., 2007).

- Second, a territorial proximity analysis is combined with the social network analysis. It aims at defining how proximities shape social interactions and also act as levers to generate collective dynamics, pointing out the role of trust and conflicts. Indeed, the structural analysis of collective action necessarily needs to combine quantitative and qualitative approaches in order to have a thorough understanding of social phenomena (Lazega, 2014). Thus, the complementary approach by the proximities would make it possible to shed light on how proximities impact collective action, to perceive what the blocking proximities are and how to bring out new proximities that respond to the challenges of collective action (Torre and Beuret, 2012). For this analysis, we conducted semi-structured interviews with forty-six of the forty-seven producer members of the association. In addition, we realized a qualitative assessment of trust level and conflicts through semi-structured interviews with forty-six of the forty-seven producer members, and each extension agent, inspection veterinarian and secretary of agriculture.

The contribution is structured as follows: The next section outlines the conceptual framework, presenting the notions of LAS, territorial proximity, as well as the question of advice in agriculture. Then, the third section presents the study area, the Serrano cheese value chain as well as the methods. After that, the fourth part presents the results. Last, the fifth and sixth section outline the discussion and the conclusion.

2. Conceptual frameworks

2.1. The concept of Localized Agrifood Systems

The concept of Localized Agrifood Systems (LAS) appeared in 1996 as a result of research conducted by the CIRAD in Latin America and West Africa (Muchnik, 2009), inspired by researches of regional science on local productive systems (industrial districts, innovative milieu and clusters), but which little explored food systems; and by researches on sign of quality (Muchnik et al., 2007). The concept of LAS has emerged from the research on agri-food systems. It questions the production-oriented model, integrating the notion of sustainability and territory

(Fournier and Touzard, 2014; Muchnik et al., 2007). More particularly, LAS focus on the relations between food identities and productive techniques, between preservation of territorial resources and qualification of the products and between agriculture and other uses of the rural territory (i.e. tourism). Nowadays, the concept has spread to the international community. In particular, a European research group (GDRE) and a research and development network in Latin America working on LAS were created (Muchnik and Sainte Marie, 2010).

LAS was defined as "production and service organizations (agricultural and agrifood production units, marketing, services and gastronomic enterprises, etc.) linked by their characteristics and operational ways to a specific territory. The environment, products, people and their institutions, know-how, feeding behavior and relationship networks get together within a territory to produce a type of agricultural and food organization in a given spatial scale" (Muchnik, 1996).

LAS are based on a territorial approach and show the particularity of the relationship between human, territory (as a physical and symbolic resource) and identity food products. According to Cañada and Muchnik (2011), their specificities rely on:

- the construction, activation and valorization of the links between human, territory and products;
- the identification of specific resources (material and immaterial) and their valorization, especially in terms of qualitative differentiation;
- geographically and socially coordination dynamics, articulating individual and collective strategies;
- diverse organizational forms, ranging from organized collective entities to fragmented atomized systems.

LAS allow synergy and complementarity among the heterogeneous actors in order to promote territorial resources. They bring forms of territorial food governance favorable to emergence of participatory dynamics, innovation and collective action (Fournier, 2016). The implementation of governance arrangements, such as producer associations, aims to gather around territorial issues and to support and secure a framework for collective action. In LAS, collective organization becomes a specific territorial resource activated by the geographical and organized proximities.

2.2. Territorial proximity as element of understanding collective action in LAS

The notion of proximity has become a research path since the 1990s and has gained prominence, especially in the French literature (Filippi et al., 2018; Pecqueur and Zimmermann, 2004; Torre and Beuret, 2012). Since the 1990s, the French School of the Proximity, composed mainly of regional economists, plays a pioneering role in this area. The main objective of this research group is to determine the nature of the effects of proximity and to establish the endogenous role of space in economic theory (Gilly and Torre, 2000). In this study, we will decline two forms of territorial proximity: geographical and organized proximity (Torre and Rallet, 2005).

First, geographical proximity is a matter of distance. It corresponds to the number of kilometers separating two entities. It is relative to the morphological features of space, where topography plays an important role. This proximity can be related to the presence of transport infrastructures that allow mobility and information and communication technologies that allow ubiquity. This is called the functional distance (Bouba-Olga and Grossetti, 2008). The potential of interaction offered by geographical proximity will depend on whether it leads to conflicts or bring benefits. The geographical proximity can be desired between actors (permanent or temporary) or unwanted (neighborhood, etc.) (Torre, 2010; Torre and Beuret, 2012).

Second, organized proximity concerns the different ways for actors to be close, outside the geographical relationship. The term "organized"

refers to any structured set of relationships without prejudging the form of the structure (e.g. firms, community). It corresponds to the ability of an organization to interact with its members (Bouba-Olga and Grossetti, 2008). The organized proximity is based on two essential, but not incompatible logics: the belonging and similarity logics (Torre, 2010).

- The belonging logic corresponds to actors of the same organization or the same network between which interactions are formed, such as exchanges of information or knowledge. Their relationship can be direct or intermediated, and also unequal in power and in access to resources. It can be measured in terms of degrees of connectivity, which reflects a greater or less organized proximity and therefore a greater or lesser potential for collective action. It is under constant construction, by adding or removing new connections in human relations.

- The similarity logic corresponds to mental adherence to common categories; it results in individuals being at low cognitive distances from each other. This logic refers to the existence of institutions, formal or informal which model the thoughts and the actions of the individuals. The individuals share social norms, common language or common values in terms of culture and religion. Thus, they are better able to collaborate as they adhere to similar reference. It is based on logic of tacit and facilitates interactions between people who did not know each other before. People linked by the similarity logic have in common a certain number of resources, material (e.g. diplomas) or cognitive and normative (e.g. routines, values) (Bouba-Olga and Grossetti, 2008).

Geographical and organized proximities are neutral in their essence, they carry potential in terms of interaction and organization but can remain unexploited if they are not activated (Pecqueur and Zimmermann, 2004; Torre and Beuret, 2012). The combination of them constitutes a powerful factor of territorial governance, which allows to overcome conflicts and misunderstandings, but also to bring together agents who did not know each other or who led uncoordinated actions (Torre and Beuret, 2012).

Trust and conflict are important dimensions for the activation of the proximities and therefore cooperation. First, trust is an important component for any cooperative relations and organizations (Dupuy and Torre, 2004). Indeed, trust lubricates interactions between actors (Arrow, 1974). It develops over time and is facilitated by the quality and quantity of social relations. It enables collective action by the development of rules and norms and allows increasing knowledge sharing and learning process (Crona et al., 2011). Trust is a central condition for the activation of the proximities, and in return the proximities are important facilitators of increasing trust relation. Second, coordination among actors has also to consider power relations and the resulting conflict dimension. Conflicts can be positive in collective dynamics when they lead to discussion and debate among actors having divergent interests or differing opinions (Torre and Beuret, 2012).

The proximity approach integrates the concept of social capital in the sense of Putnam, who defined it as "features of social organizations, such as networks, norms and trust and facilitate action and cooperation for mutual benefits" (Putnam, 1993). More precisely, organized proximity includes the bonding and linking dimensions of social capital, as well as trust (Angeon et al., 2006; Putnam, 2000; Woolcock, 1998). Indeed, the bonding dimension operates according to the similarity logic whereas the linking dimension operates more according to the belonging logic (Angeon et al., 2006; Polge, 2015). The approach by geographic proximity, in turn, provides a framework for analyzing interactions between actors located in a territory (Polge, 2015). In our study, we chose to use the proximity framework to consider simultaneously the organizational dimension and the spatial dimension in the analysis of social interactions.

2.3. Advice in agriculture

Since the early 1960s, the issue of technical and scientific knowledge diffusion to farmers has been central in agricultural development (Compagnone, 2013; Darré, 1996). Indeed, diffusion of innovations was considered as occurring, though a top-down model, occurred from

researchers and extension agents to farmers, considered then as “receptors”. To find an alternative to approaches based on the diffusion of technical and scientific knowledge, the role of extension agents has been often questioned since the 1980s in France. Indeed, it was showed that farmers do not merely implement the advice they received from experts (Darré, 1994, 2006). In fact, changing practices has a strong collective dimension. Farmers need to rely on their peers to master practices and to implement technical changes, according to their norms (Ruault and Lemery, 2009). Thus, the importance of professional dialogues among peers to understand the logics of action (Lazega, 2001) and to more precisely to understand the dynamics of technical changes in agricultural practice has been highlighted (Compagnone, 2004; Compagnone and Hellec, 2015; Darré, 1996). Also, the social network analysis approach appeared promising to show the role of dialogic professional ties between peers in mastering technical changes (Compagnone and Hellec, 2015; Conley and Christopher, 2001; Foster and Rosenzweig, 1995; Houdart et al., 2011). This approach addresses local norms and social positions of individual within the social structure. In fact, members of a farmer group do not have the same opportunity to interact and any attempt to influence the group must take into account the structure of relationships and positions.

In this new paradigm of agricultural development, the extension agents should intervene in a logic of companionship to promote local knowledge through participatory approaches to respond farmers' needs (Darré, 2006). In fact, they should support the co-conception of knowledge between peers and also ensure to operate equitably in order to decrease social hierarchies and inequalities between social groups (Hoang et al., 2006). Moreover, society has today new concerns, which is putting pressure on farmers to further modify their practices and extension agents to help align farmers' practices with new models (Compagnone, 2013). However, despite this awareness, the reorganization of extension services linked to state withdrawal and privatization is reducing the ability of these institutions to co-produce knowledge in order to respond the farmers' needs (Compagnone and Simon, 2018).

3. Materials and methods

3.1. The artisanal Serrano cheese

The artisanal Serrano cheese is a traditional raw milk cheese, produced as a by-product of beef cattle farming in the Campos de Cima da Serra in the states of Rio Grande do Sul and Santa Catarina. Sixteen municipalities within the federal state of Rio Grande do Sul and eighteen in the federal state of Santa Catarina produce artisanal Serrano cheese, together making up the Campos de Cima da Serra region (Fig. 1).

Before the 1950', Serrano cheese was mainly produced by workers in capitalist farms. Inheritance customs divided the land equally between the heirs, which led to a fragmentation of the land over time. With the decrease in the size of the farm holdings the former landlords gradually became farmers themselves (Pachoud and Schermer, 2019). Today, livestock farming is the prime economic activity in the territory (IBGE, 2018). There are about two thousand producer families and for most of them cheese making is the principal economic activity (more than 50% of the revenue). More than 90% of the farms are small-scale family systems. The most common production system is an extensive mixed dairy-beef livestock system; with dairy breeds and beef breeds simultaneously on the same farm. Only a few cows in any herd are milked for producing cheese, others are left to provide milk for the calves to produce beef. The herds graze on the natural pastures all year round, supplemented by temporary grazing on improved artificial pastures. Only 3% of the farms producing artisanal Serrano cheese are considered as intensive farming, which means dairy system without rising calves (Ambrosini, 2007).

However, cheese production is faced with administrative constraints. During the era of agri-food modernization in the 1950s, a law came into force¹ which prohibited the marketing of raw milk cheese with less than sixty days of maturation. The regulation aimed at standardizing

production processes and hygiene standards and was designed under the pressure of food industries, disregarding artisanal production. Public institutions did not provide any support to producers to adopt standards and did not determine program aiming at preserving cultural traditions of artisanal raw milk cheeses (Cruz, 2012). Today artisanal raw milk is gaining in recognition (Vitrolles, 2011). However, food industry puts pressure on public institutions to slow down the implementation of a regulatory framework on artisanal raw milk cheeses in order to restrain economic competition (Cruz, 2012; Sgarbi, 2014).

Most of Serrano cheese producers do not respect the restriction of minimum maturation because consumers prefer young cheese over matured one, and hence sell their produce within less than thirty days, which makes the sales illegal. Moreover, the sanitary norms in Brazil for dairy products do not consider the specificities of artisanal production, which are subject to the same sanitary standards and facilities as big dairy industries. Thus, making it impossible for small scale farmers to comply because of the high costs of adaptation (Cruz, 2012). Today, there are two kinds of certification authorizing the marketing of Serrano cheese but only for mature cheese, ripened for more than sixty days. First, the certification delivered from the municipal inspection service (SIM) authorizes the marketing of Serrano cheese within the area of the municipality. The inspection veterinarians employed by the prefectures of the municipalities control the health of the herd and the adequacy of the infrastructures. Only eighteen families have the SIM certification within the Campos de Cima da Serra. Second, at the state level, the law n° 14,973 and the decree n° 54,199 which legalize the commercialization of artisanal Serrano cheese were approved respectively in December 2016 and August 2018 (State of Rio Grande do Sul 2016, 2018). However, no producer has yet obtained the state certification. At the federal level, there is no legislation authorizing the Serrano cheese sales in the country. Nonetheless, producers claim that the high standards have a negative impact on artisanal characteristics of the cheese, for example, as they are required to replace wooden molds with plastic ones. Besides, the illegality of sale brings more health risks for the consumers in the long run, as there is no sanitary control (Cruz, 2012). Most of the milk processing facilities are very far from the norms required and the lack of prospects for passing the farm on to the next generation makes the producers reluctant to invest in new dairies (Sgarbi, 2014). In this context of informality, the majority of the artisanal Serrano Cheese is sold locally by direct sales to consumers or in small markets of the region (Cruz, 2012).

In our study, we will focus on the two municipalities of Bom Jesus and São José dos Ausentes, in Rio Grande do Sul because the two municipalities are the most active for defending legalization of the Serrano cheese. Indeed, the first Serrano cheese producer association of the region, called APROCAMPOS was created in 2010. Moreover, Serrano cheese production represents the main economic activity coming from family farming in both municipalities, although they sometimes diversify their production with other activities like growing of red berries, sheep breeding and winemaking. More recently bed and breakfast accommodations opened directly in the farms. Half of the SIM certification is located in these two municipalities (Table 1).

Today, forty-seven family farmers are members of the APROCAMPOS association (data on production and size of the farms are presented in Table 2). Also, the five extension agents of the two municipal offices of the EMATER-RS,² the two inspection veterinarians and the two secretaries of agriculture take part to the association. The two EMATER-RS offices are at the origin of its creation, subsequent the increasing number of controls from the state sanitary inspection since the 2000s

¹ law n°1.28.347/1952 through regulation n°30.69146/1952 (Presidency of the Republic of Brazil, 1950; 1952).

² The EMATER-RS is the private company of technical assistance and rural extension in the Rio Grande do Sul state. It was created in 1955. The municipalities have their own office with one or several extension agents working directly with the producers.

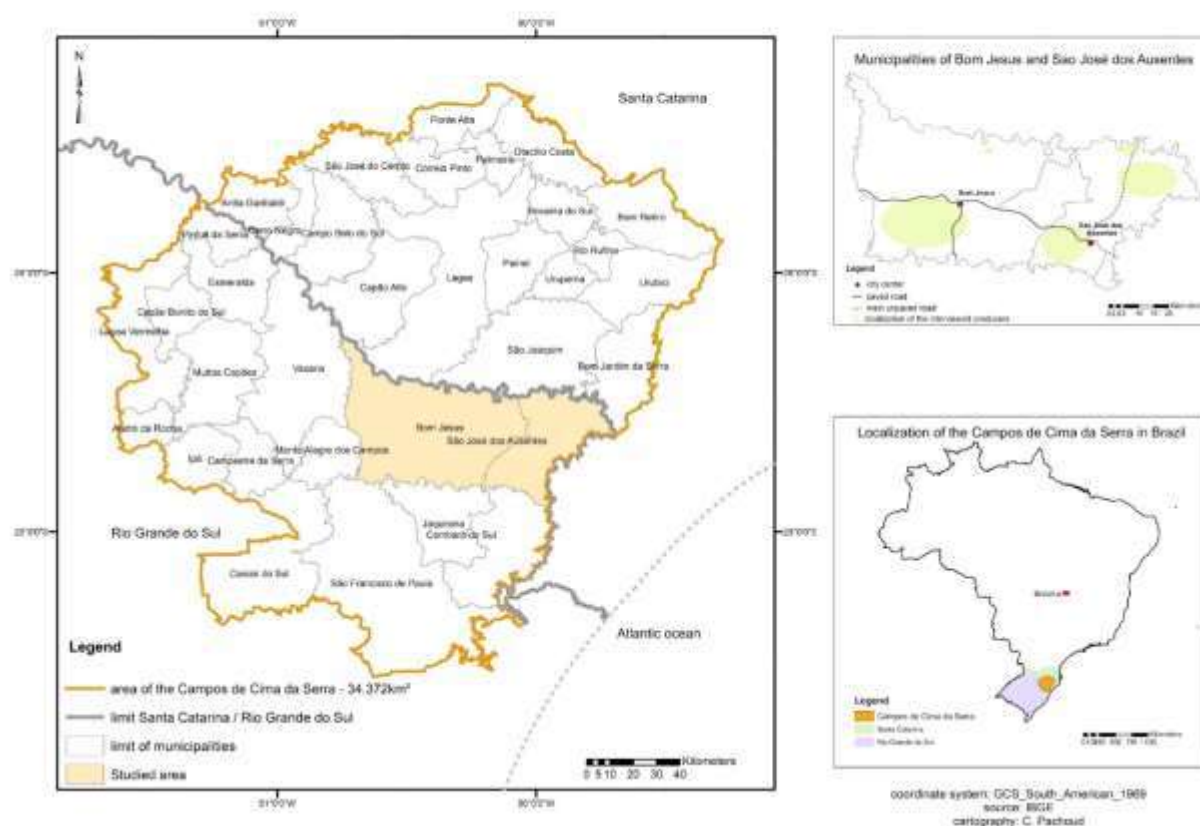


Fig. 1. Localization of the Campos de Cima da Serra and the municipalities of Bom Jesus and São José dos Ausentes.

Table 1
Production of Serrano cheese in Bom Jesus and São José dos Ausentes.

	Bom Jesus	São José dos Ausentes	Campos de Cima da Serra
Number of Serrano cheese producer families	230	200	2000
Number of SIM certification	6	3	18

Table 2
Average production and size of the farms of the forty-six family members of APROCAMPOS.

	Average	Minimum	Maximum
Number of cattle	76.0	14.0	300.0
Number of cows milked	14.0	2.0	40.0
Milk production (L milk/cow/day)	8.4	2.0	20.0
Cheese production (kg cheese/day)	11.3	2.0	70.0
Share of cheese income in total income	51.5	5.0	100.0
Total area (ha)	114.3	6.5	500.0
Area of natural pastures (ha)	78.4	3.0	460.0
Area of managed pastures (ha)	17.2	2.0	60.0

with many cases of cheese confiscations. First, strategies of the EMATER-RS tried to valorize the Serrano cheese, in projects with the objective of promoting the historical recovery of the cheese, characterizing the producing region and the cheese, registering and training producers and describing production and manufacturing processes. Second, they incentive the creation of associations. Many actions were

successful, as the obtainment of rural credits to build dairies from public governments or private institutions, the vote of state law to authorize commercialization at the state level and the request of the designation of origin in 2017 (Ries et al., 2014). The president of the association, elected for two terms, deserves also interest. He and his family privilege a small-scale production valorizing traditional know-how, but at the same time another part of the production is SIM certified, produced in legalized dairy. The traditional production is sold in a niche market in São Paulo at the highest price throughout the entire territory (50\$/kg). He is also engaged at the state level for the cheese sale legalization.

Infrastructures are little developed in the two municipalities. There are only two paved roads. The only means of transportation are private cars. The access to phone and internet is limited; the network only covers in the city centers and along the paved roads. Families of producers are isolated. Table 3 shows average distances from the farm to neighbors, city center and paved road of the forty-six interviewed families in the study.

Table 3
Average distances from the farm to neighbors, city center and paved road of forty-six family members of APROCAMPOS.

Distance (in km)	Average	Minimum	Maximum
to the nearest neighbor	0.9	0	3
to the city center of the municipality	27.3	1	52
to the nearest paved road	18.4	0	51

3.2. Methods

Interviews were conducted during three sessions of fieldwork: in February 2017, in August and September 2017 and in March 2018 in order to be able to conduct interviews with all the selected actors. During the three sessions of fieldwork, we established proximate relationships with local actors especially the extension services and some producers, which allows also conducting informal interviews and obtaining much information.³ The forty-seven family members of the APROCAMPOS association were identified thank to the help of the extension services. In fact, extension services are central for the functioning of the association (i.e. they organize monthly meetings) and have a clear idea about who participates in the association (Pachoud and Schermer, 2019). The interviews were realized with forty-six of the forty-seven producer members of the APROCAMPOS association because one of them was not at home during the fieldworks. Interviews were conducted with the heads of the household: for twenty families, man and woman were interviewed together, fifteen interviews were led only with the woman and eleven with the man. Interviews were also realized with the five extension agents, the two inspection veterinarians and the two secretaries of agriculture who are part of the association and participate to monthly meetings. The method to collect and process the data is described in the following paragraphs: qualitative assessment of trust between the actors of the association (3.2.1), collection of social network data (3.2.2), collection of territorial proximity data (3.2.3) and social network analyses (3.2.4).

3.2.1. Collection of data on trust

Semi-structured interviews with producer members aimed at describing the production system, and qualitatively documenting the trust level and conflicts with the other producers of the association, extension agents, inspection veterinarians and secretaries of agriculture of the municipalities. For that, direct questions were asked to the producer members to assess the level of trust ("Within the APROCAMPOS, what is your level of trust, from low to high, toward the producers/extension agents/inspection veterinarians/secretaries of agriculture of the municipalities?") and the level of conflict ("Within the APROCAMPOS, how do you assess, from low to high, the level of conflict with the producers/extension agents/inspection veterinarians/secretaries of agriculture of the municipalities?"). If low level of trust and high level of conflicts were evoked, interviewed producers should explain them. Interviewed producers should also indicate the frequency and the reasons of meeting with the extension agents, inspection veterinarians and secretaries of agriculture. The other actors involving in the association (extension agents, inspection veterinarians and secretaries of agriculture of the two municipalities) were also asked through direct questions to assess the level of trust and conflict with each of the actor categories of the association. Moreover, during the three work fields, informal interviews

³ This study is part of a wider investigation integrating a historical analysis of the Serrano LAS based on the role of social capital to analyze emergence of collective dynamics and qualitative assessment of the organizational and institutional arrangements implemented within the LAS to evaluate the quality of the governance at the territorial level. Thus, observations emerging from the SNA and the proximity analysis will support the results obtained in the other studies within the Serrano Cheese LAS.

and the participation to three association meetings allowed obtaining much information on trust and conflicts between the actors of the association.

3.2.2. Collection of data on social networks

Social network analyses (SNA) provides tools to understand how network structures frame collective action, as well as identifying important actors and analyzing their role in collective action (Lazega, 2014; Polge et al., 2016). This quantitative approach is commonly used to study how interactions among actors and the resulting network configurations affect collective dynamics in agriculture. Some studies used this approach to analyze social learning in the adoption of new agricultural technology in Ghana (Conley and Christopher, 2001) and in the adoption of seed varieties in India (Foster and Rosenzweig, 1995). Other studies used SNA to understand the relationship between economic development and the networks of information, capital and influence in rural Ghana (Conley and Udry, 2001; Udry and Conley, 2004), or to analyze farmer advice networks on farming practices in cocoa agroforestry systems in Ghana (Isaac et al., 2007). We used the roster method to document social network (Wasserman and Faust, 1994). This method aims at asking the producer members to cite the names of individuals they are connected with within the association through the use of the list of all the participants. For that, we analyzed both formal and informal advice exchanges concerning farming and cheese making matters to document advice relationships among actors. Advice exchange is central in collective action because it illustrates the tacit dimension of the learning process among members, central in collective action (Lazega, 2006, 2011). However, we only asked the producers and not the other involved actors because advice seeking in farming and cheese making concern above all producers. The study aimed thus at analyzing collective dynamics within the association. It is the reason why (i) we included the two forms of advice: informal advice between the producer members and formal advice from the extension agents, inspection veterinarians and secretaries of agriculture (Isaac et al., 2007); and (ii) we did not seek if these exchanges occurred among members of the nuclear family. We asked the producers to cite the names of who advise them on how to improve their farming and cheese making activities ("who are the most important people of the association for advising you to improve your farming and cheese-making activities on the farm?"), by showing them the roster of all the actors involved in the association. We asked the question at the end of the interview because the producers felt more comfortable with the interviewer.

3.2.3. Collection of data on territorial proximity

The analysis of the geographical and organized proximities was realized through semi-structured interviews with the forty-six interviewed producer members of the APROCAMPOS association. First, the questionnaire referred to the geographical proximity. The first questions were related to the permanent geographical proximity. We asked each producer for the distance in kilometer from the farm to the city center of their municipality, from the farm to the nearest paved road and from the farm to the nearest neighbor (Table 2). Then, we asked questions concerning the temporary geographical proximity. For each producer family, we asked for the numbers of travels to the city center per week, the yearly frequency of participation in the monthly meetings of the association, in cheese contests and in courses given by the extension services. Second, it referred to the organized proximity. We considered that the belonging logic corresponded to the actors' advice network of the association APROCAMPOS. It means the forty-seven producer members, the five extension services and the two inspection veterinarians and secretaries of agriculture. The structural and positional approaches of the SNA allowed assessing this belonging logic. Regarding the similarity logic, we considered social norms in terms of culture and religion. For that, we asked the families if they participated to masses of local parishes, local rodeo contests and Gaucho fests, which

represent important cultural celebrations in the region.

3.2.4. Social network analysis

We analyzed two networks: the advice network including the formal and informal advice relationships and the advice network of the informal advice exchanges between peers after removing the formal advice. For that, we used two kinds of approaches. First, the positional approach that aims at characterizing the position of each individual in the network using indicators. Second, the structural approach that aims at characterizing the network's structure at different scales: i. global, using indicators and an algorithm for communities' detection, and ii. local, using ERGM's to analyze connectivity patterns between pairs or triads of nodes. These analyses were conducted with R version 3.5.1 using the series of extensions dedicated to network analysis: *igraph* for descriptive measures (Csardi and Nepusz, 2006) and *statnet* for ERGMs (Handcock et al., 2008).

In order to identify central actors in the advice network, we computed two positional indicators for measuring actors' centrality on both directed networks, using the *igraph* package. First, the indegree centrality represents the number of edges incoming to a node. It measures the popularity and prestige (Wasserman and Faust, 1994) and can be used as an indicator of the informal status of actors (Lazega et al., 2012). Then, the betweenness centrality measures the number of times a node lies on the shortest path between other nodes (Borgatti et al., 2018; Wasserman and Faust, 1994). It allows identifying actors on directed network who are in a brokerage position, it means actors who act as "bridges" between actors or communities of the network, precisifying if they are giver or receiver of advice (Burt, 1992).

In order to document the cohesiveness of the network and the mutuality of the relationships, we computed structural indicators in *igraph* package on directed network for measuring: the density (proportion of ties in a network relative to the total number possible) on both networks and the reciprocity on informal advice network (producers mutually linked). The transitive triad corresponds to the scheme: actor *i* selects actor *j*, actor *j* selects actor *k* and actor *i* selects actor *k* (Wasserman and Faust, 1994). This form of triad signals a concentration of leadership by actors who have a higher formal or informal status (Lazega, 2011). The cyclic triad corresponds to the scheme: actor *i* selects actor *j*, actor *j* selects actor *k*, who in turn selects actor *i*. In this form of generalized exchange, trust comes into play (Lazega, 2011). We computed the number of transitive and cyclical triads on the informal advice network implemented in *igraph* package. In order to inform on the fragmentation of the network, we used for both networks the community structure detection method (Crona et al., 2011) based on the Girvan-Newman algorithm implemented in *igraph* package (Newman and Girvan, 2004). A community corresponds to groups of individuals that are more connected to each other compare to the rest of the network (Borgatti et al., 2018; Lazega, 2014).

Last, in order to control for the effects of endogenous and exogenous processes in shaping the advice network, we used ERGM (Exponential Random Graph Model). ERGM was implemented on the directed network including the formal and informal advice in *statnet* to quantitatively analyze the networks' structure. These models allow testing if the structure of the observed network differs from what would be expected if relationships were established randomly, and to further detect which variables contribute to explain its structure. These variables can be of two kinds: endogenous, i.e. network-dependent effects reflecting processes of self-organization and exogenous and directly linked with the structure of the studied network, i.e. linked to the attributes of the nodes, reflecting the formal status of the producers (Lazega et al., 2012) and to independent dyadic phenomena (Lusher et al., 2012; Robins et al., 2007). We list in Table 4 all the variables selected and the associated hypothesis concerning social processes involved in ties

establishment.

4. Results

4.1. Social network analysis

Fig. 2 presents the advice network including the formal and informal advice (all the participants of the association) documented through sociometric interviews with the forty-six producer members of the APROCAMPOS association.

4.1.1. Trust and positional indicators

The descriptive analysis of the network including formal and informal advice with *igraph* (Fig. 2.) first shows that the actors who were the most cited by the producers, i.e. having the highest informal status, are the extension agents of both municipalities (a total of eighty citations). Some other actors have in less extent a high indegree, like one inspection veterinarian (V1), one secretary of agriculture (S1) and one producer who is the president of the association (B15). The actor having the highest betweenness centrality is the producer B15, president of the association (betweenness centrality = 10). He received advice seeking from seven producers, however he sought advice only from formal sources of information (extension agents, veterinarians and secretaries of agriculture). In sum, advice seeking rely mainly on formal sources of information (71.8% of the advice receiving ties), principally on extension services (59.3% of the advice receiving ties) (Table 5). The centralized network, with extension agents being at the center, demonstrates a top-down model. The president, in brokerage position, plays a central role in the information flow from formal source of information to peers and also in the network cohesion, linking more peripheral producers.

Results of the qualitative assessment of the trust level between the producer families and the other actor categories of the association are summarized in Table 6.

The assessment of trust shows that the extension agents are the only actors of the value chain who enjoy a high level of trust from the producers, also supported by the highest indegree. Forty-five of the forty-six families of producers qualified the level of trust with the extension services from good to high. The extension services are the only structure for advising the producers on farms, in average one visit per week to one per month.

Concerning the inspection veterinarians, they interact only with legalized producers or those who want to start the process of legalization. It is the reason why only twenty-nine of the forty-six families could not assess their trust level as they do not work with inspection veterinarians. Among the respondents, fourteen considered their trust level from good to high and three as low. The trust level depended mainly on the role that the veterinarian takes. In São José dos Ausentes, the veterinarian takes a role of adviser and is a lot engaged in the legalization struggle in the association and at the state level. She enjoys a good reputation to the producers and got a relatively high indegree (six citations). Whereas, in Bom Jesus, the veterinarian takes a role of controller; establishing a relation of authority with producers. He was not cited on the advice network and two families claimed having conflicts with him.

Last, the relationships between the agricultural secretaries and the producers are much more contrasted. Indeed, twenty-nine families of producers qualified the trust level with the agricultural secretaries from good to high, sixteen as medium to low and one did not answer. However, many producers complained that the politics do not support the small-scale producers and the artisanal cheese production, their opinion is much more a question of family or political proximity. This is the reason why producers do not seek many advices to the secretaries of

Table 4
Variables selected for the ERGM of advice network.

Structure variables (edge-terms)	Terms	Process	Hypothesis	
Exogenous variables	Edges	Density (base term)	The probability of existence of a link corresponds to the density of the network.	
	GWESP GWOSP	Common partners between nodes which are tied (trial closure) Common partners shared by two individuals, whether connected or not (multiple connectivity)	Two actors linked to a third one tend to establish advice ties	
Exogenous variables	Attributes reflecting the formal status of the producers	Price (node attribute)	Producers having a higher formal status are more likely to be sought for advice	
		Production of cheese (node attribute)		
	Geographical proximity	Level of intensification (node attribute)	Price of the cheese per kg Quantity (kg) of cheese produced per day	
		Position in the association (node attribute)	Intensive system (dairy breeds, artificial insemination, supplementation all year round) (vs traditional system (mixed dairy beef herd, natural service, supplementation only in winter)) Members part of the board of direction (vs members not part of the board of direction)	
		Certification (node attribute)	SIM certified production (vs not SIM certified)	
		Diploma (node attribute)	With tertiary education	Geographical isolation of the producers decreases the likelihood of being sought for advice
	Organized proximity	Distance to center (node attribute)	Distance of the farm to the city center (km)	
		Distance to road (node attribute)	Distance of the farm to the paved road (km)	
		Municipality (node attribute)	Living in Bom Jesus vs São José dos Ausentes	
		Distance (independent dyadic phenomena)	Distance between two actors of a dyad (km)	
		Massé participation Rodeo contests participation Gaúcho feis participation	Participation to cultural celebrations increases the likelihood to be sought for advice	

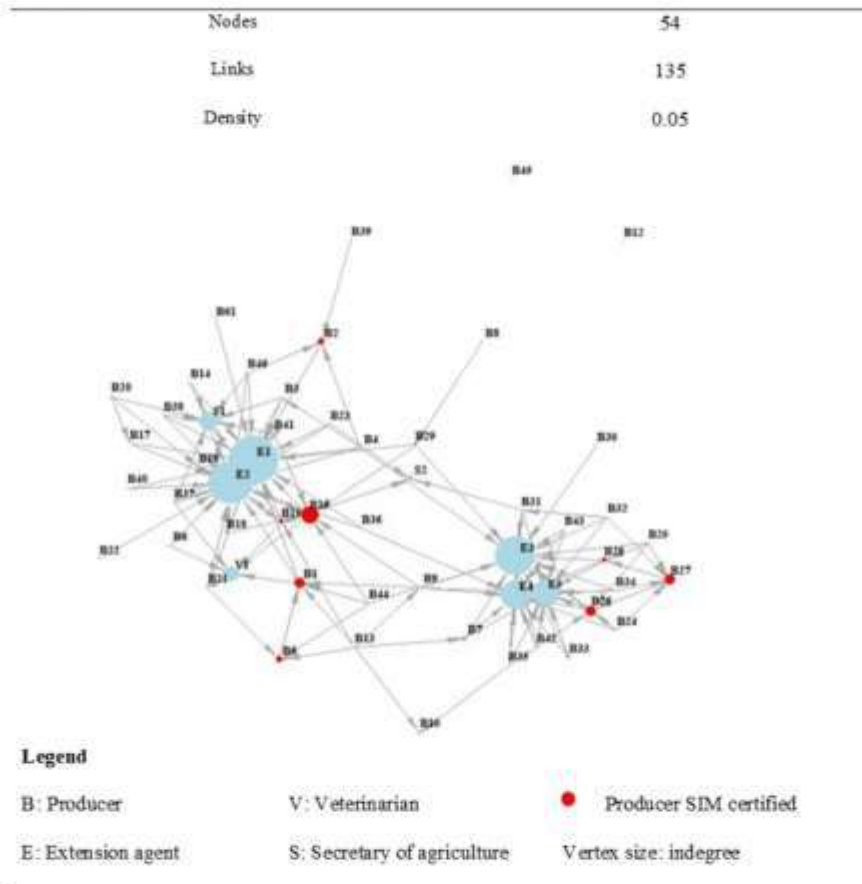


Fig. 2. Network including formal and informal advice of the APROCAMPOS association.

agriculture.

Fig. 3 presents the informal advice network between the forty-six producer members of the APROCAMPOS association, after removing formal advice.

When focusing on the informal advice network for positional indicators (Fig. 3.), we observe that the producer with the highest indegree, it means the most popular and prestigious producer among peers, is the president of the association (indegree = 7). B1, B26 and B27 have also, in a less extent, a high indegree (indegree = 4). These four central producers have the SIM certification. Moreover, B1, B15 and B26 are part of the board of direction (B15 is the actual president and B1 was the first president). This result show that these four popular

Table 6

Assessment of the level of trust between the producer families and the other actors of the APROCAMPOS association.

	Producers
Producers	-
Extension agents	+
Inspection veterinaries	+/-
Agricultural secretaries	-

Level of trust: low: -; medium: +/-; high: +.

Table 5

Number and proportion of advice receiving ties (indegree) according to the formal or informal sources of information.

		Total number of advice receiving ties (indegree)	Share of advice receiving ties (%)
Formal advice seeking to:	Extension agents	80	59.3
	Inspection veterinarians	6	4.4
	Secretaries of agriculture	11	8.1
	Total of formal advice ties	97	71.8
Informal advice seeking between peers		38	28.2
Total		135	100

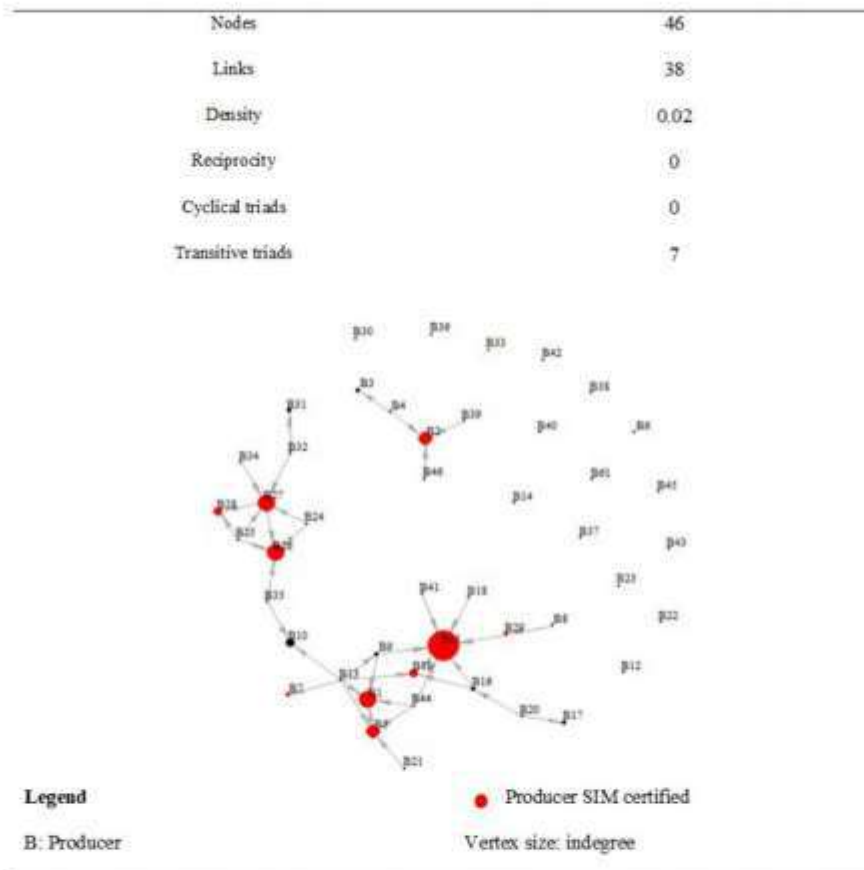


Fig. 3. Informal advice network between peers of the APROCAMPOS association.

producers, having a SIM certification and being members of the board of direction, have a higher formal and also informal status for advice among peers. Considering the betweenness centrality, we observe that the values are low. B27 has the highest betweenness centrality, equal to 5. This producer, who is SIM certified, is giver and receiver of advice. Otherwise, betweenness centrality is equal to 0 for forty producers and it is comprised between 0.5 and 2 for five producers. Moreover, we observe that producers only cited thirty-eight times another producer, it means 28.1% of the total advice seeking ties (Table 5). This demonstrates a low advice flow among peers. This observation supports the trust assessment between the producers in which low trust level among producer families (Table 6). Latent conflicts were also identified, especially among certified and non-certified producers. The first ones claimed that (i) the non-certified do not respect the hygiene standards which represented a danger for the consumers and affected the image of the producers using good practices; and that (ii) they sell to a lower price which leads to a price decrease for the certified producers. On the other side, many non-certified producers claimed that the legalized ones do not produce traditional cheese anymore, because of the standards that change its characteristics. Also, there were jealousy feelings. Some producers claimed that some certified producers are favored by the extension services and the inspection services, applying less exigent standards. Moreover, results indicate that 43% cited extension agents in first position, then 33% of the producers cited the nuclear family (not

included in the result as intrafamily ties are not analyzed), but only 13% cited other producers at the first place. This information cannot be integrated in the quantitative analysis but appeared important to show the lack of advice exchange between families.

4.1.2. Structural indicators

Concerning the structural indicators on the advice network including all the actors of the association (formal and informal advice) (Fig. 2.), we observe that the density is low (0.05) because the mean number of ties established by producers is low (2.9 per producer; $SD = 1.5$). The network is centralized, the extension agents being at the center. Regarding the community detection presented in Fig. 4, the community structure detection method based on the Girvan–Newman algorithm allows distinguishing two big communities (green and yellow) which corresponds to the spatial repartition of the actors according to their municipalities. The nodes which appear at the edge of the two big communities and in the in-between small red community are producers geographically located at the border of the two municipalities. Then, there are three peripheral families, tied by only one actor. Last, two isolated nodes appear in the network. The two families claimed to not receive advice from outside. They have a small level of production; they receive seldom visits from the extension services and have no contact with the inspection veterinarians. Also, they are moved away from the community life (little participation to the association,

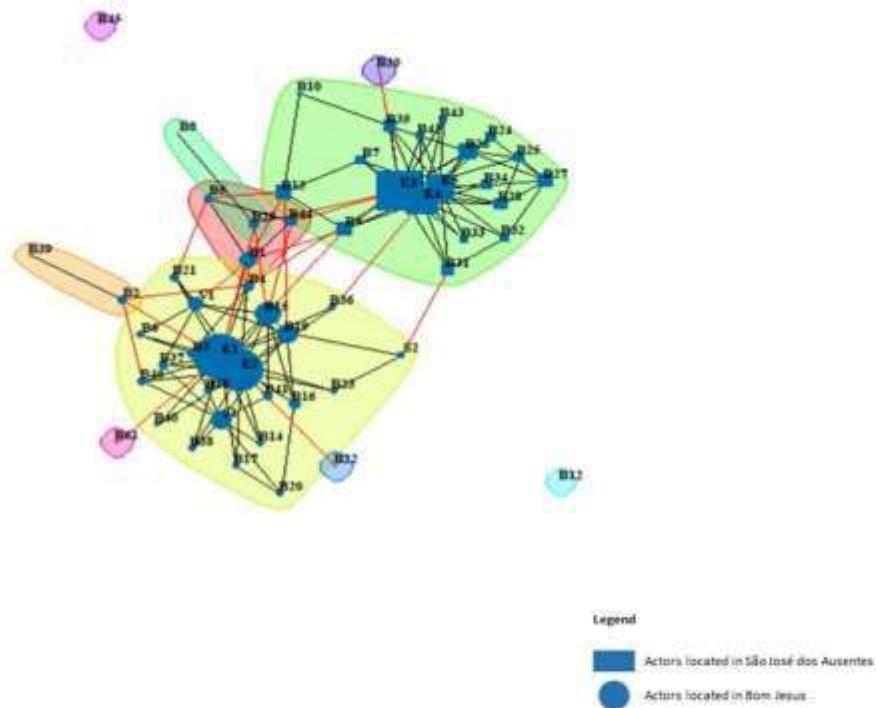


Fig. 4. Community repartition on the network including formal and informal advice of the APROCAMPOS association.

contests, courses, etc.).

Relating to the informal advice network between peers, after removing formal advice (Fig. 3.), the density was 2.5 times lower

compared to the whole advice network. It means that producers interacted little for advice (0.8 per producer; SD = 1.2). There was no reciprocity. The network counted seven transitive triads but no cyclical

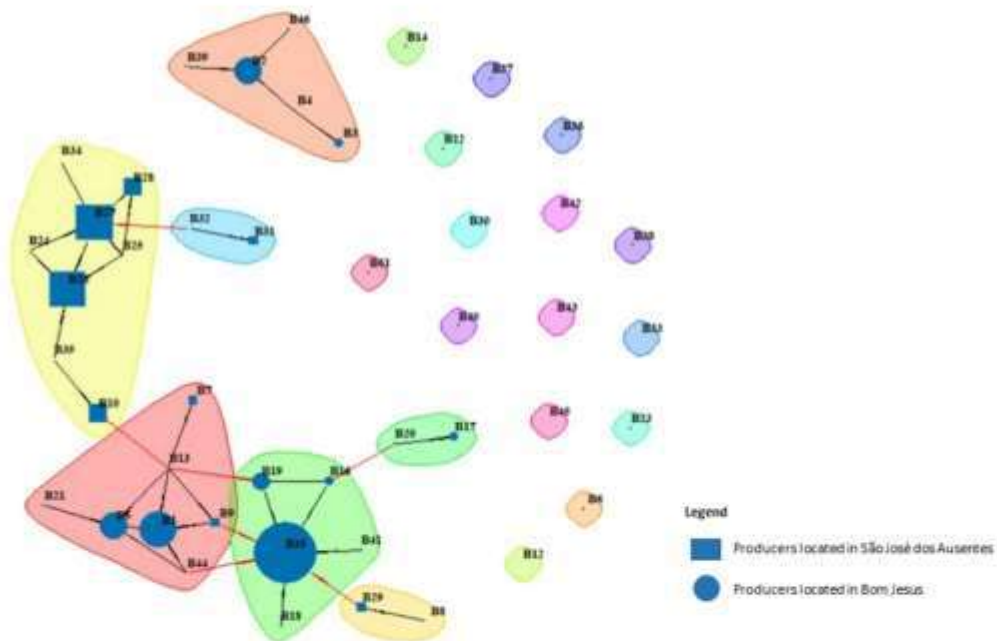


Fig. 5. Community repartition on the informal advice network among peers of the APROCAMPOS association.

Table 7
Estimated coefficients and standard errors for the parameters of the final model.

Terms	ERGM
Edges	−1.59 (0.26) ***
GWESP	0.81 (0.23) ***
GWDSP	−0.52 (0.07) ***
Price of cheese sale (R\$)	0.05 (0.02) *
Intensification level (traditional)	−0.69 (0.18) ***
Diploma (tertiary education)	0.90 (0.19) ***
Distance to paved road (km)	−0.03 (0.01) ***
Municipality (Bom Jesus)	−0.71 (0.17) ***
Rodeo contest participation	−0.79 (0.20) ***
Akaike information criterion	1077

Parameter estimates are expressed in log-odds with their standard deviation (SD) in parentheses. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

triads. These results show a lack of exchange between producers for advice and a lack of trust due to the absence of reciprocity and cyclical triads. Then, the community detection among peers based on the Girvan–Newman algorithm (Fig. 5) shows that there are four communities in the network. The producers among a community interact mostly within the neighborhood. Fig. 1 shows the repartition of the farms within the municipalities. We observe that two communities (red and orange) are located in the southeast of the study area, one community (yellow) in the southwest and one other (green) in the northeast. Nonetheless, the network is sparse with many isolates (fifteen families) and three dyads formed between neighbors at the periphery.

4.1.3. Statistical analysis on the advice network

The results of the final model for statistical analysis on the directed network including formal and informal advice is presented in Table 7.

ERGM results first showed that the distribution of the edges in the network was unlikely to be due to chance as the edge effect was significant (-1.59 ; $p < 0.001$). The best model with respect to the AIC retained endogenous variables and attributes reflecting socio-economic status of the producers, geographical and organized proximities presented in Table 7. Goodness of fit results are presented in Appendix (Figure A). Concerning the endogenous variables, transitive closure effect was significant (0.81 ; $p < 0.001$), indicating that producers were more likely to establish ties if they had common exchange partners. Correlatively, the significantly negative estimate for multiple connectivity indicated that untied actors have a lower probability to have common partners than at random for advice seeking (-0.52 ; $p < 0.001$). The conjunction of a positive triad closure effect (GWESP) accompanied by an absence of cyclical triad, showed previously with igraph package, demonstrate that triads are transitive. It means that there is a local hierarchy by a concentration of leadership in advice toward individual of higher formal or informal status.

We then computed estimates for exogenous variables corresponding to producers' attributes reflecting their formal status, to test if they influenced the probability of emergence of advice relationships among individuals. There was a marginally significant effect of the price at which producers sell cheese on advice ties probability (0.05 ; $p < 0.1$), indicating that producers who sale at a higher price were more sought for advice. There was also a significant effect of the level of intensification: producers with traditional production system were less sought for advice than producers having a more intensive production system (-0.69 , $p < 0.001$). Last, producers with a higher education level were more sought for advice (0.90 ; $p < 0.001$). The position of the producers in the association (i.e. if he or she was at the board of direction or not), the ownership of the SIM certification as well as the quantity of cheese produced did not have any significant effects on

advice ties emergence probability. To sum up, cheese price, intensification level and education appear to be key factors determining the formal status of the producers for advice.

Last, we tested if the advice relationships within the network were structured by other external attributes than individuals' attributes, and tested for the effect of variables related to geographical proximity and to organized proximity for the similarity logic. Concerning the geographical attributes, we found that families which are located far from paved road were less sought for advice (-0.03 ; $p < 0.001$). Although we found that there was a significant effect of the municipality: the producers of Bom Jesus were less likely to form advice ties compare to the ones located in São José dos Ausentes (-0.71 ; $p < 0.001$). There was no significant effect of the distance between two actors in creating advice relationships. Then, considering the attributes related to the similarity logic of the organized proximity, producers who do not participate in rodeo contests were less sought for advice (-0.79 ; $p < 0.001$). However, the participation in masses and Gaucho fests were not significant. In sum, the more the producers were isolated the less they were sought for advice. Proximity to roads had a positive effect on the probability of formation of an advice tie. Moreover, rodeo contests, as important cultural event, increased interactions between producers of the association for advice.

5. Discussion

The advice network analysis among actors of the producer association APROCAMPOS showed that the extension agents are the most prestigious and popular actors. The network is centralized on the extension agents, having the highest indegree. The qualitative analysis revealed that they are the most important actor for advising producers directly on the farm and they further enjoy a high level of trust from the producers. Thus, the majority of advice regarding farming and cheese making matters is sought from advisors and not from peers. This result demonstrates a top down model in which advices are transmitted from extension services to producers.

Previous studies showed that extension agents are the drivers of collective action: they incentive the creation of the associations and they are central for its functioning (for example they organize the meetings and set the agenda) and for inviting new members (Pachoud and Schermer, 2019). However, the top-down process shows limitations, in which local knowledge is not integrated in projects of cheese valorization. Also, Vitrolles (2011) brought forward the same scheme for the registration of the Serrano cheese under a geographical indication: few producers understood that was the purpose of this tool. Even if Marwell et al. (1988) showed that the centralization of network ties can have positive effects on collective action, it depends mainly on single persons. In our study, extension agents showed a high level of initiatives however many findings have already demonstrated that top-down models are rarely efficient and successful for collective action while a bottom-up process requires the broad involvement of local people (Ostrom, 2004). In this sense, Hoang et al. (2006) demonstrated that extension agents tended to contact more powerful and wealthier farmers, reinforcing local hierarchies. Moreover, knowledge of the producers is most of the time undervalued. To better respond to producer needs, local knowledge needs therefore to be enhanced in more participatory governance frame (Darré, 1996). For that, the extension agents should intervene in a logic of companionship to support the exchange of advice and information, and therefore the co-conception of knowledge among peers (Compagnone and Hellec, 2015; Darré, 2006).

Further results showed that the producer president of the association is in brokerage position in the advice network. He seeks advice from extension agents, inspection veterinarians and secretaries of agriculture and gives advice to peers, strengthening thus the top-down

model of advice flow. Nonetheless, this actor plays a central role in the network (Burt, 2005). He links the different communities and peripheral producers within the networks through his brokerage position. In this sense he has a role in cohesion and equity by advising more marginal producers. Also, he is crucial for the information flow from formal source of advice to the peers, learning process and also implementation of innovations that emerged from he and his family. The president and his family for example developed an innovative cheese making process and sold cheese in a niche market in São Paulo. Moreover, during the interview it became apparent that the president established relationships with extraterritorial actors, who served as instrumental support for the defense of the cheese at an upper scale. Indeed, he has relationships with several researchers at the national or international level and one state deputy active in the struggle for the cheese legalization. In this sense, this actor has a central role in collective action and therefore in governance.

Considering the informal advice network among peers for the positional indicators, we observed first that the most prestigious and popular producers, having the highest indegree (informal status), are the president of the association, and in a lesser extent, three other producers. They all have the SIM certification and three of them are part of the board of direction (including the actual president and the first president). Thus, among peers, the SIM certification and the membership to the board of direction seem to be determinant attributes to define producers of higher formal status, more sought for advice. These producers of higher informal and formal status play an important role for advice. However, the presence of extension agents in the roster could have reduced the number of advice seeking ties toward producers and the two attributes were not significant in ERGM. In this sense, the informal advice network could deserve further research, including the implementation of ERGMs. Nonetheless, the focus of our study is the analysis of collective action within the association and required for that the inclusion of all the involved actors. Second, the betweenness centrality is overall low among peers in the directed network, which strongly inhibits advice flows and limits network cohesion.

The structural approach defined two main communities in the network including formal and informal advice, corresponding to the geographical dispersion of the actors according to their municipality. The network was centralized with few isolates, extension agents of each municipality being at the center of their respective communities. Lazega and Pattison (1999) demonstrated that higher cohesion in smaller communities allows a better accessibility to the actors to the whole network, preventing exclusion of the more peripheral ones. Further, Marwell et al. (1988) showed that higher interdependence among actors, through a higher density network, demonstrated better potentials of collective action. Moreover, in the informal advice network, there was neither a direct nor indirect (cyclic closure) reciprocity among producers. This network turned out to be sparse, without reciprocity and with many isolates. Thus, advice exchange among peers is low, producers rely largely on formal advice. Further, the community detection allowed defining four communities and three dyads which gather producers living close. Advice exchange between peers seems to occur more at the neighborhood scale than at the municipality scale as showed in the advice network including formal source of information.

Furthermore, the qualitative analysis showed that producers stay in their families and rarely move. Also, one third of the respondents cited the nuclear family in first position to the question related to the advice network, although they were not asked to cite the nuclear family. These results revealed a lack of exchange, trust and reciprocity between the producer families. Building on the work carried out by Sligo and Massey (2007), the producers show characteristics of pre-modern society in respect of trust, as defined by Giddens (1990), which is based predominantly on localized and intrafamilial relationships. According to

Ostrom (2010), the level of collective action depends on three variables: trust, reputation to be trustful and reciprocity. Repetition of interactions leads to positive reinforcement of these three variables and to a higher level of cooperation. Previous observations showed that the lack of trust and reciprocity decreases the level of collective action. There was a lack of engagement of the producers in the association, for example only few of them participate regularly in the meetings. More generally, few producers are members of the association, which represents, despite the top-down approach, the only collective organization acting for the defense of the Serrano cheese (Pachoud and Schermer, 2019). Moreover, the informality of the value chain could also explain the lack of interaction and trust which do not favor cooperation and rather generate conflicts. The qualitative approach highlighted latent conflicts among certified and not certified producers. Also, conflicts were observed among producers and inspection veterinarians, as well as secretaries of agriculture. Conflicts with veterinarians happened when they take the role of controller rather than adviser. Concerning the secretaries of agriculture, many actors indicated that they do not support the cheese production enough. This may thus be a major lock-in factor for the development of the value chain. According to Torre and Beuret (2012), conflicts are part of participatory processes but they have to be revealed and discussed between the actors to move forward concertation. In this sense, the association shows potential to resolve conflicts, by bringing actors together. Furthermore, previous works showed that the history of the region could also illustrate the lack of interaction and trust. Until the 1950s, there was no cooperative relationship between the Serrano cheese producers as cheese was mainly produced by workers in capitalist farms. Today the higher necessity to defend the traditional cheese facing growing industrialized food processes led to the need for cooperation between the new family producers (Pachoud and Schermer, 2019).

Then, effects of endogenous and exogenous processes had a role in shaping the network including formal and informal source of advice. The significant over-representation of triad closures in the networks highlighted by ERGMs results and the absence of cyclic triads defined by igraph package showed that triads are transitive. This demonstrated a local hierarchy in advice, which indicates that some actors have a certain authority linked to their formal or informal status (Lazega et al., 2012). In fact, the actor seeking advice acknowledges the status of the advisor, which may be informal or formal. Here it is clear that extension agents have the most prestigious informal status for advising, as they have the highest indegree centrality. They enjoy also a higher formal status considering the revenue and the educational level, compared to family farmers. Nonetheless, producers of higher formal status, represented by a higher diploma, a higher intensive production system and a higher cheese selling price, tend to be more sought for advice. Studies have shown that status-differentiated groups will tend to be more successful in collective action. Status acts as a coordination mechanism: members of higher status initiate collective action and contribute at higher levels and influence those of lower status to follow with larger contributions (Berger et al., 1977; Simpson et al., 2012; Willer, 2009).

Variables related to proximities brought elements of understanding of the interactions' patterns of the advice network. Concerning the geographical proximity, the lack of infrastructures, for example paved roads or internet and telephone networks, extends the functional distances which may result in a decrease of interactions and in return leads to a lack of trust and reciprocity among the families. Not surprisingly, statistical analysis showed that the higher the distances from farm to paved road are, the less people interact. In the same way, Houdart et al. (2011) showed that geographical proximity, facilitated by the presence of roads, increase the opportunity of encountering and therefore had an important role in advice exchange. Also, community detection showed

that actors interact firstly within their municipality. The natural tendency of withdrawal on a local logic, but also on similarity logic of coordination was also showed by Polge et al. (2016), who worked in "Territories of Citizenship" in the Brazilian Amazon. Cooperative relations and trust for collective action can be improved by incentives to meet each other in order to build organized proximity (Torre and Beuret, 2012). Several levers exist to favor interaction occasions between actors who would not necessarily meet otherwise. Polge and Torre (2018) demonstrated that in two public policy arrangements in the Brazilian Amazon, great distances between actors made their interactions difficult but not impossible. For that, the improvement of the infrastructures and punctual support for the cost of transport were applied to facilitate the translocation and to increase temporary geographical proximity. Moreover, geographical proximity needs to be crossed with organized proximity to develop interactions. Indeed, participation in cultural life (e.g. rodeos contests) allows increasing the interaction opportunity. However, cultural events do not occur often, for example, masses happen once a month and gaucho fests only few times a year, which do not provide many opportunities for encounter. The association meetings are the best way to increase interactions and trust between producers. Similarly, other initiatives undertaken by extension agents, such as cheese contests and courses offered to improve production allow the development of new spaces of interaction. At the end, increasing interaction would eventually lead to higher trust between the producers (Crona et al., 2011). Nonetheless, the construction of a belonging logic of organized proximity needs to exceed the level of sole participation of local actors of the Serrano cheese value chain (producers, extension agents, inspection veterinary). The development of interactions at an upper-level (inter-municipality, state or federal level) through the construction of institutional arrangements are crucial (Polge et al., 2016). In fact, the Serrano cheese represents an important specific resource for the territorial development which needs implementations of specific policies to achieve quality standards and qualification (Colletis and Pecqueur, 2004). Also, cooperation with other territorial actors, among others tourist operators, seems highly recommendable. These are instrumental conditions for favorable territorial food governance frameworks to implement common projects of development.

However, three limitations of this paper need to be mentioned. 1) The inclusion of formal institutions, especially extension services, has certainly reduced the number of advice ties that could have occurred within peers. Indeed, giving technical advices for the extension agents is a part of their job. Nonetheless the focus of this study are collective dynamics within the association. That is why it was crucial to include all actors involved in the association. 2) Producers tended to quote extension agents because of the turn of the question ("most important"), it might have been better to ask "whom do you ask for advice concerning farming and cheese making matters?", or even distinguishing the formal and informal advice seeking in separated questions. Also, the informal advice network could deserve further research, including the implementation of ERGMs. The meaning of advice could be better defined in a sociometric question because this notion could hold different meanings of advice, which connect different people and yield different structures (Cross et al., 2001). 3) Advice relationships tend to make more ordinary social relations between peers invisible (e.g. personal

support), that can lead to other network structures (Cross et al., 2001).

6. Conclusion

The relational approach combining network and proximity analyses appeared to be of particular relevance to study collective action within a LAS. Based on the example of the APROCAMPOS association in the Serrano cheese LAS, we showed that social interaction patterns influence collective action. The top-down process conducted to centralized network, in which extension services were drivers of collective action but producers were not fully involved in projects of cheese valorization. Also, the absence of reciprocity and a lack of trust among producers led to a low level of cooperation. At the same time, geographical isolation and bad infrastructures seem to limit their interactions. Producers need to increase the number of interactions to improve trust and reciprocity and therefore collective action. In this sense, territorial proximity through for example association meetings or cultural life gives opportunities of interactions. Nonetheless, institutional arrangements appear instrumental to favor interactions at an upper-scale to define political orientation through the implementation of specific policies. Also, cooperation with other actors of the territory to integrate different goods and services are central in an objective of territorial development.

In conclusion, a top-down model leads to low level of initiative and participation of the producers in collective action. Local actors need to build common projects together for the valorization of the Serrano cheese in order to master their own model of development. For that, they require a more participatory governance frame, through horizontal coordination among the actors of the Serrano cheese LAS, which involved producers, extension services and local authorities. Nonetheless, the integration of the different scales of action to implement specific policies and also the establishment of cooperation with other territorial actors, related for example to the increasing tourism in the region, promote the creation of enabling an environment for territorial food governance. The combination of these elements is crucial to meet quality standards and qualification of the Serrano cheese and in a larger extent to the development of the territory as a whole.

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Declaration of competing interest

None.

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Appendix. Goodness of fit results for directed advisory network

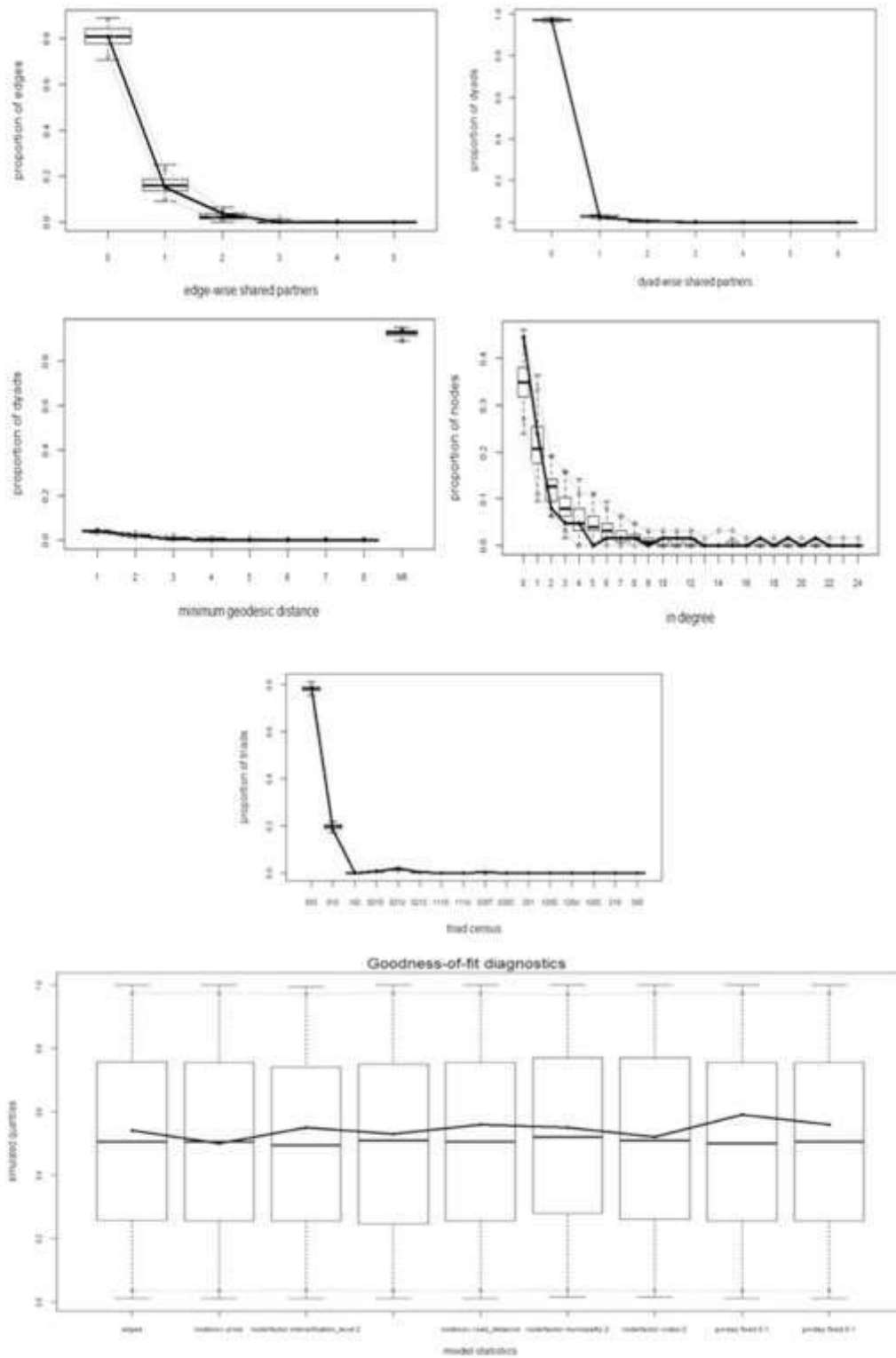


Fig. A. Goodness of fit results for edge-wise shared partners, dyads wise shared partners, minimum geodesic distance, indegree and triad census parameters and for the statistical model for directed network including formal and informal advice.

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Article

A Relational Approach to Studying Collective Action in Dairy Cooperatives Producing Mountain Cheeses in the Alps: The Case of the Primiero Cooperative in the Eastern Italian Alps

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Abstract: Compared with more productive areas, mountain areas are at risk of being marginalized, particularly in the agri-food sector. To circumvent price competition, local actors in the mountains can develop specialized local products, which depends on their capacity to act collectively. Collective action, however, is complex and needs to be better understood if it is to steer initiatives towards success. This article sets out a relational approach to studying collective action in a dairy cooperative located in a mountain area: The Primiero cooperative in the Italian Alps. The common pool resources and territorial proximity frameworks were combined in a social network analysis of advice interactions among producer members, and an analysis of trust and conflict among members and between members and other actors involved in the value chain. The results show that the success of collective action can be explained by various complementary factors. Firstly, members had dense relationships, with high levels of trust and reciprocity, while the president had the role of prestige-based leader. Nonetheless, the analysis also highlighted conflicts related to the production levels of “traditional” and “intensive” producers, although members demonstrated a high capacity to resolve conflicts by creating their own rules to control further intensification. Socio-economic status did not appear to play a role in advice relationships, showing that the members interact horizontally. However, the results show that the geographical isolation of some members tended to inhibit their commitment to the collective dynamics. At a higher level, trust toward other actors involved in the value chain plays a central role in carrying out joint projects to develop and promote cheese.

Keywords: collective action; cooperative; trust; social network; mountain cheese; province of Trento

1. Introduction

Globalization and production-oriented agriculture lead to the standardization of food products [1,2], often resulting in the loss of traditional products, as well as the practices and know-how related to their production [3]. However, globalization can also awaken the creativity of local actors, inspiring them to mobilize and draw together the various resources of a territory (e.g., identity, know-how, landscapes, biophysical attributes) in order to develop products with local specificities [4]. This process

of differentiation is a means of overcoming market competition in terms of costs and prices, as regional resources are not transferable to other locations [5]. It relies, however, on the ability of local groups to organize themselves and develop original models to identify and deliver these specificities [4].

Different factors may favor or limit collective action for the differentiation of specific food products. Trust among producers is a central element in successful collective action (e.g., reference [6] in France), and the lack of trust in their failure (e.g., reference [7] in Mexico; reference [8] in Brazil). Nonetheless, conflicts are also part of the collective dynamics. According to Torre and Beuret [9], conflict should not lead to a breakdown in dialogue between parties, but should rather strengthen the resolve to find a solution. Collective action achievement relies on specific network structures. It requires high levels of density (i.e., proportion of ties in a network relative to the total number possible) and reciprocity (i.e., mutual relations) among producers. According to Merklé [10], trust is proportional to the density. Cases of low density and reciprocity associated with collective action failure are reported in the literature. For example, Faysse et al. [11] studied two dairy cooperatives in Morocco with 180 and 140 members, respectively, and found that the first had a very low density (0.35%) with two reciprocal links, and the second had a density of 0.56% with one reciprocal link. Pachoud et al. [8] showed that the advice network of 46 producer members of an association for the protection of Serrano cheese in southern Brazil had a density of only 2% and there was no reciprocity. Certain variables appear to be instrumental in increasing trust and reciprocity, and therefore contribute to the success of collective action, and these include the size of the organization and face-to-face communication [12]. In fact, size influences the frequency and regularity of face-to-face interactions, and therefore the opportunities to strengthen trust. Collective organization often requires leadership based on prestige in order to overcome problems in collective action, as for example demonstrated by [13,14]. Leaders can arbitrate in conflict resolution, can reward as well as reprimand, and can establish goals or act as coordinators. Prestige-based leadership has a less coercive and hierarchical appearance than imposed leadership [15]. At the same time, leaders may be held more accountable for the failure of collective action [16]. Next, geographical proximity can play an important role in facilitating interactions among producers. In fact, some studies have shown that geographical isolation inhibits interaction and therefore cooperation [8,17]. These factors underline the importance of taking an interest in collective organization, in order to understand success or failure of collective action and to be able to propose avenues for improvement.

This study sets out a relational approach to the process of collective action among members of a dairy cooperative located in a mountain area for the production of differentiated cheese. To this end, we drew on two frameworks: Common pool resources (CPR) and territorial proximity (TP). Firstly, we used the CPR framework to investigate the normative and multilevel institutional dimensions of collective action. This allowed us to assess the local actors' capacity for self-organization through the design of rules and establishment of norms (e.g., trust). At the same time, it allowed us to take into account the potential role of government in supporting collective action [12,18]. Secondly, the TP framework integrates the geographical and organized relationships into the analysis [9]. Our method was to first conduct an informal advice network analysis among producer members [19], as collective action requires the exchange of different kinds of relational resources, among which the sharing of advice among peers is indicative of cooperation levels [20]. However, to gain a thorough understanding of social phenomena, collective action must necessarily be analyzed both quantitatively and qualitatively [21,22], and so a complementary analysis that assessed trust and conflict was carried out. Until now, only a few studies have considered the importance of social relations in analyzing the success or failure of collective action in rural areas through a combination of quantitative and qualitative approaches. In Northern European countries, these included evaluation of the EU's LEADER initiative [23]. In southern hemisphere countries, studies were conducted in Brazil on a cheese producers' association in a context of informal production [8], and in Kenya on the sustainability of smallholder dairy cooperatives in a context of market economies [24]. The present article will add to these reflections on the form and substance of the social relations, including the institutional and

geographical dimensions, underlying successful collective action for differentiated cheese production in the Alps in western Europe.

The study was conducted in the Primiero dairy cooperative in the province of Trento in the eastern Italian Alps, where dairy cattle farming is an important economic activity sustained by the processing of milk into high value cheeses, mostly by dairy cooperatives [25]. The cooperative has 47 members, and in 2018 it had the best economic results of all the province's dairy cooperatives. It therefore constitutes an interesting case study of relational processes aimed at improving our understanding of the success of collective action and in order to identify potential threats to the collective dynamics.

2. Conceptual Framework

2.1. Applying the Common Pool Resource (CPR) Framework to a Dairy Cooperative

The common pool resource (CPR) framework was developed by Elinor Ostrom (Nobel Prize in Economic Sciences, 2009) and her colleagues from the Bloomington School. They conducted numerous studies on self-organized communities managing CPRs (e.g., pastures, fisheries, forests) to identify the preconditions for sustainable management [18]. They demonstrated that the success of collective action in managing CPRs mainly relies on norms and the design of institutional arrangements.

Firstly, norms can help resolve problems in collective action [12]. According to Ostrom, successful collective action is based on trust and reciprocity, which positively reinforce each other. Trust, defined as one individual's expectations of the behavior of others, improves the likelihood of initiating cooperation. Dupuy and Torre [26] identified three kinds of trust: (1) Community trust linked to family, religious, or ethnic characteristics; (2) interpersonal trust that relies on mutual commitments between two individuals in repeated, face-to-face situations; (3) organizational trust that is an extension of interpersonal trust to the principle of collective action, in which commitment has two dimensions: (i) Implicit, which entails repetition of the interactions, and (ii) explicit, which, in a situation of prior commitment, is formalized through internal rules. Reciprocity contributes to the development of long-term obligations between individuals [12]. When, in a repeated situation, some individuals initiate cooperation, others learn to trust them and are more willing to adopt more reciprocity norms and cooperate in the future. Thus, levels of trust and reciprocity are mutually reinforcing. Ostrom [12] identified many other variables that affect trust and reciprocity, and therefore the likelihood of collective action, such as the size of the group, the presence of leaders, and face-to-face communication.

The capacity of groups to act collectively also depends on institutions. Institutions are defined as regulations, "shared understandings among those involved that refer to enforced prescriptions about what actions are required, prohibited, or permitted" [27]. They include monitoring and sanction mechanisms [18]. For North [28], institutions "have been devised by human beings to create order and reduce uncertainty in exchange." In many cases, the success of collective action is highly dependent on institutional arrangements constituted by participants in a self-governing process, rather than imposed by external authorities [29]. Nonetheless, governments are also important in supporting local collective action by offering adequate legal frameworks, and technical or financial support [12,18].

The CPR framework will be applied in the present study to investigate the normative and multilevel institutional dimensions of collective action in the case of a dairy cooperative producing high-quality mountain cheese. This framework will be integrated with the territorial proximity framework to include further variables in the analysis of collective action.

2.2. Territorial Proximity as a Means of Deepening Understanding of Collective Action

The notion of proximity has been a research path since the 1990s, and has steadily gained prominence, especially in the French literature [9,30,31]. Since the 1990s, the French School of Proximity, composed mainly of regional economists, has played a pioneering role in this area. Its main objective is to determine the nature of the effects of proximity and to establish the endogenous role of space

in economic theory [32]. In this study, we will draw on two forms of territorial proximity (TP): Geographical and organized proximity [8,33].

Geographical proximity is a matter of distance. It corresponds to the spatial distance (e.g., number of kilometers) separating two entities. It also depends on the morphological features of space, with topography playing an important role, and can be related to the presence of transport infrastructures, and information and communication technologies. This is called the functional distance [8,34].

Organized proximity refers to the different ways actors can be close to each other, aside from their geographical relationship [30]. It is based on two essential, but not incompatible, logics: Belonging and similarity [8,35].

Belonging refers to actors of the same formal network (i.e., organizations). In this study, it corresponds to the network of producer members of the cooperative.

Similarity refers to the existence of similar representations that model the thoughts and actions of the individuals, thus facilitating collaboration. The actors linked by this logic have a certain number of common cognitive (e.g., cultural) or material (e.g., socio-economic) resources [30].

Both proximities carry potential in terms of interaction and cooperation, but unless they are activated they cannot be exploited [9,30]. They make it possible to answer these questions: How do geographical proximity and the similarity logic of organized proximity affect processes of collective action among the members of the cooperative (i.e., the belonging logic of organized proximity)? How can one act to facilitate the emergence of missing proximities to respond to challenges to cooperation?

3. Materials and Methods

3.1. The Primiero Dairy Cooperative

3.1.1. General Presentation

The Primiero dairy cooperative is located in the northeast of the province of Trento, in northeastern Italy (Figure 1). The cooperative collects milk from 47 members in five different municipalities: Canal San Bovo in the Vanoi valley, and Fiera di Primiero, Imer, Mezzano, and Sagron Mis in the Primiero valley.

The cooperative is associated to Concast-Trentingrana, a consortium of dairy cooperatives in the province of Trento. The consortium offers technical assistance to dairy farms, carries out milk and cheese analyses for the quality payment scheme, ripens and markets cheeses that are not sold directly by the dairy farms, and produces butter and milk powder. Seventeen dairy cooperatives comprising 729 farmers are currently associated to the consortium. The cooperatives process approximately 80% of the milk produced in the province (120,000 tons a year) [36]. In 2018, the Primiero cooperative paid the highest price of all 17 associated cooperatives to its members: €0.66/kg [37]. Between 2008 and 2018, the prices paid by the cooperative were on average 38.5% higher than the national reference price [38].

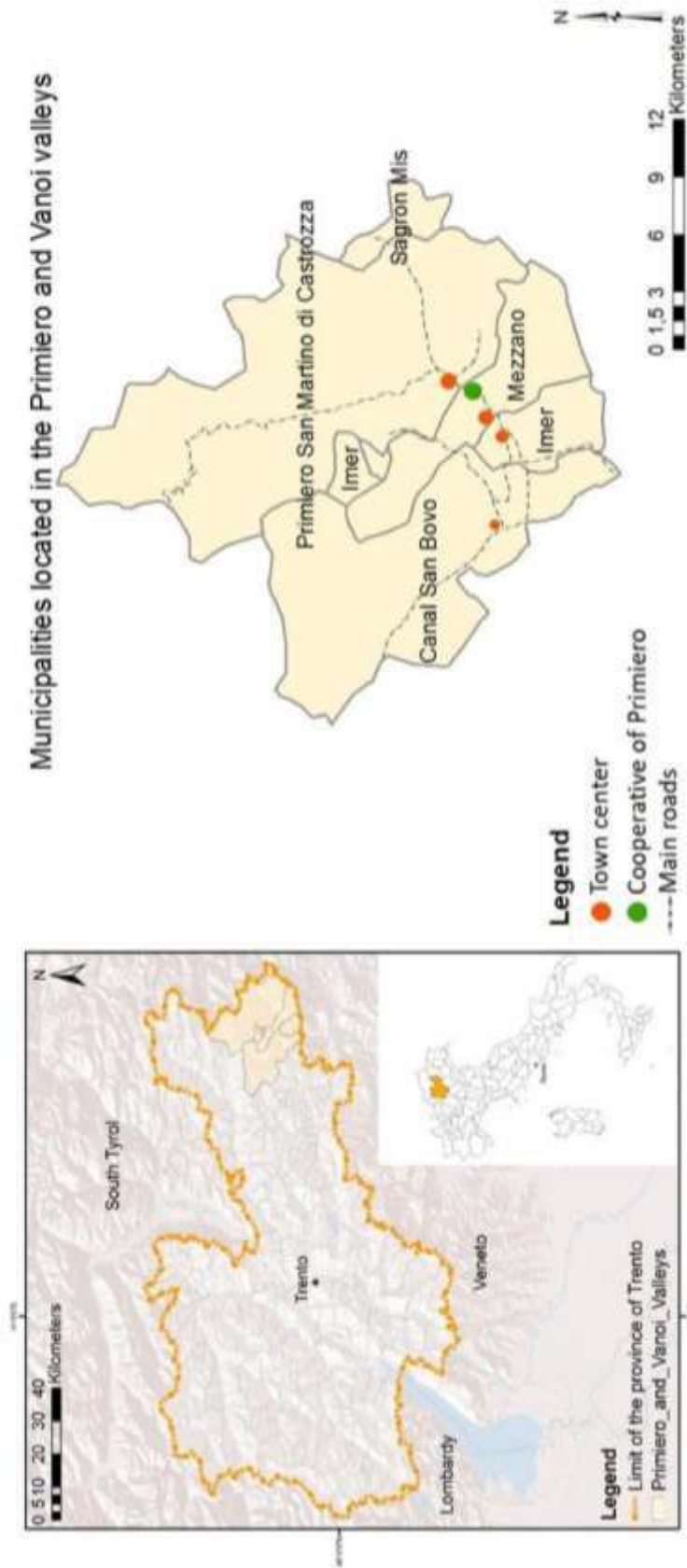


Figure 1. Location of the province of Trento and the municipalities providing milk to the Primiero cooperative (source: Own elaboration).

3.1.2. Elements of Success of Collective Action

In the Primiero and Vanoi valleys, people lived in a subsistence economy until the middle of the 20th century, with cheese destined mainly for self-consumption. From the 1960s, the “modernization” of agriculture resulted in a large increase in milk production [39]. The shift from a subsistence to a market economy was the main factor enabling the creation of the cooperative, which was founded in the village of Mezzano in 1971 by 18 producers. Cheese production began in 1981, once building construction and provision of equipment were completed. With better equipment and the expertise of professional cheese makers, the cooperative was able to significantly increase the sanitary quality and to standardize the organoleptic properties of its products. During its first year, many farmers joined the cooperative, but since then, the number of members has decreased from around 300 to 60 today (including summer farms), while the quantity of milk processed has increased from 1400 to 5400 t (Figure 2). This came about essentially from the widespread abandonment of small farms, and an increase in the productivity of the active farms, a situation that has characterized all the Alpine areas [40]. At the present time, the cooperative processes milk into different sorts of cheese (e.g., *Trentingrana* Protected Designation of Origin (PDO), *Nostrano*, *Dolomiti*, *Tosela*, *Puzzone di Moena* PDO). These days, tourism is also instrumental in promoting awareness of high-quality cheeses in the province of Trento, and especially in the Primiero valley due to its proximity to the Dolomites. More than one third of the cheese produced by the cooperative is now sold in its store, while agri-tourism on summer farms is increasing year on year. Today, eleven members of the cooperative with summer farms offer agri-tourism services in summer. Cheese making from Alpine pasture milk concerns 17.5% of the *Trentingrana* produced by the cooperative, 100% of the *Puzzone di Moena*, and 16.3% of *Nostrano*.

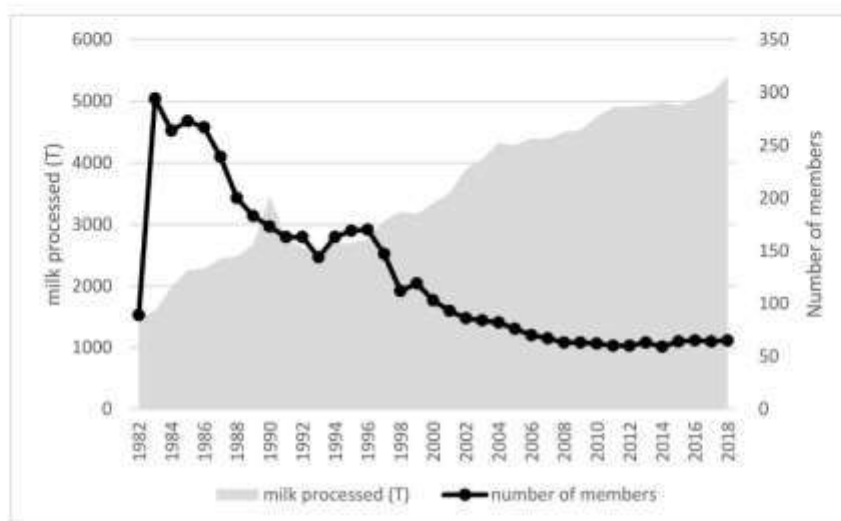


Figure 2. Evolution of the number of members and the quantity of milk processed in the Primiero cooperative from 1982 to 2018 (source: Primiero cooperative).

3.1.3. Present Characteristics and Specification Requirements of Production

All members bring their entire milk production to the cooperative for processing. No producer feeds their animals on silage. Most of the farms have mixed breed herds (i.e., Brown Swiss, Simmental, Alpine Grey, Rendena, and Holstein Friesian). According to Sturaro et al.'s [25] classification of the different dairy production systems in the province of Trento, the farms in the Primiero and Vanoi valleys follow a traditional system, small in area and herd size, and with low milk production (Table 1). Only 17 farms have free-stall housing, while the other 30 have tie-stalls, and only two use total mixed

rations (TMR; a modern feeding regime). Forty-five farms move their lactating cows to summer farms, although a quarter of these do not move the entire herd.

Table 1. Farm sizes and milk production of the dairy farm members of the Primiero cooperative in 2019.

	Average	Median	Minimum	Maximum
Utilized agricultural area (ha)	17.0	15.0	2.0	40.0
Lactating cows (<i>n</i>)	18.8	20.0	1.0	37.0
Milk production (t/year/farm)	106.0	100.8	0.0	300.0

Specification requirements for milk and cheese production are defined at different scales. First, at the European scale, the Trentingrana was PDO certified in 1987 and the Puzzone di Moena in 2014. The PDO specifications prohibit the use of silage and require that at least 75% of the forage comes from the geographical area. Second at the provincial level, the consortium developed for all the cooperative members the quality payment scheme of milk and cheese in 1972 and specifications for the production of milk in 1990 (e.g., list of authorized feeding, prohibition of silage and genetically modified organisms (GMOs), hygiene practices). Third, at the cooperative level, milk quotas were introduced in 2019. The idea emerged after the end of European quotas in 2015, which exacerbated the tendency toward intensification. According to the director, the cooperative's total production increased by 5% in 2018. Internal quotas for each farm were calculated on the basis of the average production between 2014 and 2018. Maximum production was fixed at 300 t/year, and quotas are not transferable to another member. Any member wishing to increase production, and new members, have to acquire new quotas at a cost according to their production level, as shown in Table 2. These new regulations constitute a local system of monitoring and sanctioning. If a member exceeds his/her quota, the regulations provide for a penalty of €0.10/kg of surplus milk to be imposed.

Table 2. Prices determined by the cooperative for acquiring milk quotas.

Production Level (t/year)	Price for Acquiring New Quotas (€/kg)
15 to 100	0.10
100 to 200	0.20
200 to 300	0.30

3.2. Methods

Interviews with local actors were conducted during the summer of 2019. The 47 members of the cooperative were referred to us by the director, and interviews were carried out with 45 of them, as two were unavailable during the fieldwork period. The methods used to collect and process the data are described in the following paragraphs (Sections 3.2.1 and 3.2.2).

3.2.1. Assessment of Trust and Conflicts

At the cooperative level, members were asked direct questions to assess their level of trust toward the other members on a scale from 0 (low) to 10 (high). They were then also asked to assess the level of conflict among members, on a scale from 0 (no conflict) to 10 (many conflicts). The producers had the opportunity, if they wanted, to explain the reasons for their assessment. The explanations provided were useful to get a more precise idea on the level of trust and to characterize the conflicts between the members.

At the provincial level, members were asked to assess their level of trust toward other actors involved in the value chain on a scale from 0 (low) to 10 (high). The provincial scale is relevant for the analysis because most of the actors involved in the value chain are organized at this scale and the

provincial government has implemented policies to favor cheese production and valorization [41]. These actors are public authorities, which include the provincial government, municipal authorities, and the Paneveggio-Pale di San Martino Nature Park (PPSM, a protected area of the Autonomous Province of Trento, covering about 20,000 ha in the east of the province); public institutions and other associations providing advice and services to cooperatives and farmers, which include the Federation of Cooperation of the Province of Trento (FCPT, which has the role of representing, assisting, protecting, and reviewing the balance sheets of the province's cooperatives), the Concast-Trentingrana consortium, the Federation of Breeders of the Province of Trento (FBPT, a cooperative with 800 dairy farmer associates, which provides members with monthly individual milk production and quality recordings, and assists them in marketing heifers and in collecting male calves and culled cows for beef production), the Edmund Mach Foundation (EMF, a public institution of the Province of Trento with a central role in agri-food research and in advising and training producers), and Slow Food (a nonprofit organization which has awarded "presidium" status to *Trentingrana* and *Piuzzone di Moena* cheeses), the public veterinary service (PVS, which supervises compliance with health and hygiene regulations governing milk and cheese production), and private veterinarians (PV, who assist farmers in herd health management).

3.2.2. Assessment of Territorial Proximity: Social Network Analysis

Complete social network analysis (SNA) strives for exhaustive knowledge on the presence or absence of a specific relationship between all the members of an organization. We used the roster method to create the social network [42], which involves asking each participant to provide the names of those to whom they are connected. We chose to focus on the informal advice relationships among members, as it is an interesting indication of the level of cooperation among them [20]. We therefore asked each producer member to cite from a list of all the members of the cooperative the names of those whose advice they seek on how to improve their farming activities ("Who do you go to for advice in making improvements to your farm management?"). Other relationships can be highlighted depending on the focus of the study, such as friendship to analyze close personal relationships [19], although this was not the aim of the present study.

To analyze the advice network of producer members of the cooperative, we used three approaches to directed networks ("positional approach," "structural approach," and "exponential random graph model—ERGM" (Table 3) in R version 3.5.1, using the *igraph* [43] and *statnet* [44] packages.

Table 3. Summary of the approaches and indicators used for the social network analysis (SNA).

Approach	Indicators	How is it Analyzed?	What Question does it Answer?
Positional	Indegree centrality	Number of advice requests received	Who are the prestigious actors?
	Betweenness centrality	Number of times a node lies on the shortest path between other node pairs	Which members contribute to greater cohesion and information flow in the network?
Structural	Density	Proportion of ties in a network relative to the total number possible	What is the level of interaction, and therefore trust, among members?
	Reciprocity	Members mutually cited	What is the level of reciprocity among members?
	Community identification using the Louvain algorithm	Network partition into communities (i.e., denser groups of members) through optimization of the modularity	Are there denser groups of members within the cooperative? What are their characteristics?
ERGM	Endogenous attributes	Network-dependent effects reflecting processes of self-organization	What endogenous attributes have an effect on the structure of the network?
	Exogenous attributes	Geographical attributes linked to geographical proximity, and formal status linked to the similarity logic of organized proximity	What attributes of territorial proximity favor interactions? What are the blocking attributes?

Firstly, the positional approach is used to characterize the position of each individual in the network, and reveals whether some actors have more influence on collective action than others [8,45]. We computed the indegree centrality, which represents the number of edges incoming to a node (i.e., the number of advice requests received), and reflects the position of the individual in the network [42]. This indicator is linked to the informal status and measures the prestige of actors who have a role as leader [46,47]. Then we computed the betweenness centrality, which measures the number of times a node lies on the shortest path between other node pairs [48], thereby identifying actors who act as “bridges” between the other actors or communities of the network. Actors with high betweenness centrality play a central role in network cohesion and information flow [49].

Secondly, the structural approach is used to characterize the network’s structure and understand how it frames collective action [8,21]. In order to assess the cohesiveness of the network and the mutuality of the relationships, we computed density (proportion of ties in a network relative to the total number possible) and reciprocity (producers mutually linked). These indicators reveal the level of trust and reciprocity among the actors. We used community structure detection to assess the fragmentation of the network [45]. A community is a group of individuals that are more connected to each other compared with the rest of the network [48]. For this, we used the Louvain algorithm, which optimizes the modularity of a partition of the network. Modularity measures the density of edges within communities compared with the density of edges connecting the communities with each other [50]. The Louvain method was chosen because its performance is usually of a high level [51].

Thirdly, we used ERGM to control for the effects of endogenous and exogenous processes in shaping the advice network. These models allow us to test whether the structure of the observed network differs from what would be expected if relationships were established randomly, and to identify those variables that contribute to explaining the structure [8]. These variables can be of two kinds: Endogenous, i.e., network-dependent effects reflecting processes of self-organization; and exogenous, i.e., linked to the attributes of the nodes or independent dyadic phenomena [52,53]. The selected exogenous variables reflect the different dimensions of TP, which are geographical variables linked to geographical proximity, and socio-economic status (i.e., formal status) linked to the similarity logic of organized proximity. In addition, we analyzed homophily for some attributes to see if members who are similar for some variables tend to form denser advice relationships. All the variables selected and the associated hypotheses concerning social processes involved in the establishment of ties are listed in the Supplementary Materials (Table S1). Exogenous variables were obtained through semi-structured interviews with the members.

4. Results

4.1. Trust and Conflict Assessment

In this section we present the results on the levels of trust and conflict among members, and the levels of trust toward other actors involved in the value chain.

Within the cooperative, the median value of trust among members was 7.75 (Figure 3). Members were generally of the view that trust between them was high. Trust is both community-based and organizational, and has developed over the long term as the families involved have been established in the region for several decades and even centuries. They are gathered in villages, and they all know each other—conditions that allow community trust to be built. Moreover, a culture of cooperation has developed in the province over the centuries, which has reinforced organizational trust. Summer farms have been managed collectively for centuries, providing an important basis for cooperation, while cooperatives started to be created at the end of the 19th century to deal with the problems of poverty and environmental crisis [41]. Within the cooperative, organizational trust is reinforced by face-to-face exchanges between members (informal, or formal during assemblies) and by the internal regulations governing production [27]. Another important element in strengthening interactions and trust is participation in cultural events, linked to the similarity logic of organized proximity [8].

Cultural events related to cheese or livestock are, in fact, central to the cultural life of the cooperative's producers: forty-three out of the 45 members said that they participated in at least one local festival each year. For example, the *Desmontegada* celebrates the end of the transhumance to summer farms and is one of the most important festivals that take place in the villages.

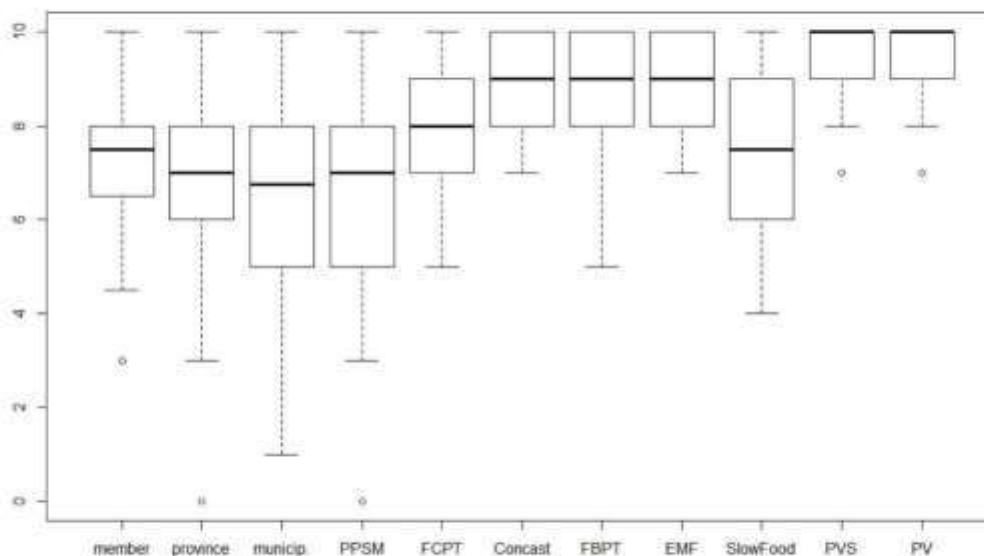


Figure 3. Boxplot of assessment of trust among members, and between members and other actors (province = provincial government; municip. = municipal authorities; PPSM = Paneveggio-Pale di San Martino Nature Park; FCPT = Federation of the Cooperation of the Province of Trento; Concast = Concast-Trentingrana consortium; FBPT = Federation of Breeders of the Province of Trento; EMF = Edmund Mach Foundation; PVS = public veterinary service; PV = private veterinarians).

Perceptions of conflict varied greatly among the members: The median value of conflict assessment was 5, with the first quartile 3, the third 7, and the total range varying from 0 to 10. Six producers thought there were no conflicts or they did not know about them. These producers are all located in the municipality of Canal San Bovo, the furthest from the cooperative (Figure 1): They are at an average distance of 12.2 km, compared with the overall average of 5.4 km. Two of them mentioned geographical isolation as inhibiting information flow, and three of them do not participate in the cooperative's general assemblies.

The main area of conflict, cited by 31 producers, was related to the production systems, and more specifically farm size. The producers described two contrasting groups: The "traditional" group with small farms and lower production levels, and the "intensive" group with larger farms and higher production levels attained through technical innovations (i.e., TMR, greater use of concentrate supplements, free stalls). "Traditional" producers were often characterized as old, and "intensive" producers as young. Most of the producers thought that some members had excessively increased their total milk production. They explained that the conditions in the mountains are not conducive to high levels of production, as grass forage is locally available, whereas cereals as feed sources are not, and the environmental conditions are unfavorable. They considered the region unable to sustain intensive milk production systems, and defended the system using on-farm forage production without dependence on imported feed. Opposed to this view, other farmers with higher milk production levels said that some producers have a closed mentality and adhere to a past model of farming rather than looking toward the future.

At the territory level, the medians of members' degrees of trust toward the various other actors were high overall, between 6.75 and 10 (Figure 3). However, some distinctions between these actors

can be drawn. Regarding public authorities, the median values of trust were 7 toward the provincial government, and 6.75 toward the municipal authorities, among the lowest values given by the producers. Seven producers complained that the province took too long to distribute subsidies, whereas previously it was faster. On the other side, four members said their expectations of the provincial government were high, and that it showed an interest in livestock breeding and cheese production (for example, government representatives attend the cooperative's general assemblies). Nonetheless, the provincial government appears decisive for promoting cheese production and valorization. Since autonomy was granted in 1948, the province has fostered cooperatives and the livestock sector [41]. For example, the provincial government offers subsidies to support cheese production, and promotes labels or brands to highlight the quality of products linked to their geographical origin (e.g., *Qualità Trentino*). The values for trust in the municipal authorities were more widely spread, between 1 and 10. Eleven producers complained that their municipality did not support farmers, had little awareness of the breeders' activities, and did not understand their circumstances (for example, some municipalities had complained about the dirt and noise emanating from farming activities). According to the producers, this lack of understanding is a problem that has worsened during recent years. It can be explained by administrations losing proximity with the producers because of the decreasing numbers of people employed in agriculture.

The median value for trust toward FCPT was 8. Producers have a generally good opinion of the Federation, and many mentioned its importance for successful cooperation in the province.

The median value for trust toward the Nature Park was 7. Eight producers complained about the park's regulations regarding environmental conservation, claiming that the park makes no attempt to understand the producers' circumstances, and that the conservation regulations are too stringent.

The median value for trust toward the Slow Food organization was 7.5. Three producers said that the production specifications for designations are too stringent and look to past production systems. For example, there are now breeds that are more productive and need diets with greater amounts of concentrates. On the other side, these producers think that Slow Food presents a good image of their products to consumers.

The median values of trust toward advisory services, which include the EMF, the FBPT, and Concast, were 9. These entities have direct and regular interactions with the members. Two EMF technicians visit the producers once a month. They currently have two projects underway with members of the cooperative: One for improving the quality of meadows and pastures, the other for improving milk quality. With regard to FBPT, visits vary from once a month to once a week for milk control. Only one producer had a conflict with this entity: His family breeds Alpine Grey cattle and he finds the FBPT puts too much interest in the Brown Swiss breed. Lastly, the Concast-Trentingrana consortium visits the farms two to three times a month to monitor milk quality, the basis on which the price paid for the milk is determined. No conflict with the consortium was reported.

Finally, trust toward the inspection services and private veterinarians were the highest and had the lowest variability, with median values of 10 (in both cases, the interquartile range is 1). Private veterinarians are contacted in case of need, while the veterinary inspectors visit every farm at least once a year to carry out blood analyses, monitor animal welfare, hygiene, and food security, and register the animals. Many producers said that the new veterinarian, who has occupied the position for 1.5 years, insists on strict compliance with the law, but they thought it fair.

4.2. Social Network Analysis

This section presents the results of the SNA, firstly on positional indicators, then on structural indicators, and thirdly on the ERGM.

4.2.1. Positional Indicators

Regarding positional indicators (Figure 4), the president of the cooperative (node 1) had the highest indegree centrality, with 22 advice requests received. He is therefore the most prestigious

member (highest informal status). Moreover, his legitimacy is all the greater as he was put forward by the members to be the new president after the sudden death of the previous incumbent. He also had the highest betweenness centrality, although producers 9, 25, 27, and 40 also had similar betweenness centrality values. The president was more often sought for advice than he was a seeker of advice: Twenty-two members cited him, whereas he sought advice only from three members. The other four producers were more often askers of advice (31 advice requests made), but they were also sought for advice, although to a lesser extent (19 advice requests received). The president's farm has a high level of production (above the cooperative's average) and uses free-stall housing. Members 9 and 25 operate a traditional system with low levels of production (below the cooperative's average), whereas members 27 and 40 have an intensive system with high levels of production. These four members are not currently on the board of directors.

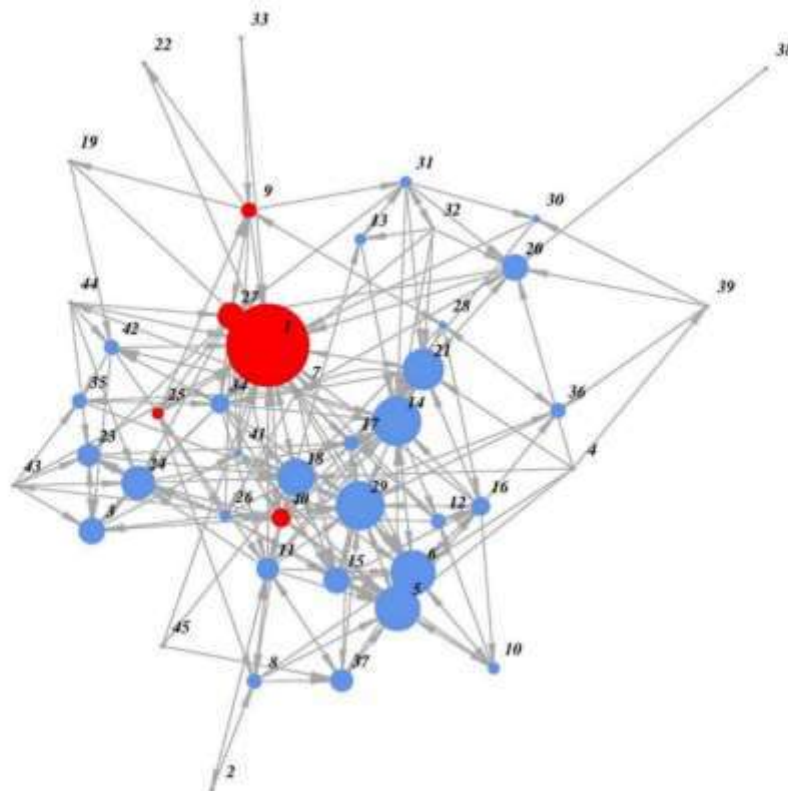


Figure 4. Network advice among the members of the Primiero cooperative (45 nodes; 220 links; size of node = indegree centrality; red = betweenness centrality value over 220).

4.2.2. Structural Indicators

Regarding structural indicators, the level of density was 11%, a high value due to the large number of producers cited: An average of five (ranging from one to 15). Reciprocity was also high (30%), as almost one third of the producers cited each other.

Regarding the fragmentation of the network, the Louvain method identified five communities (Figure 5), described in Table 4.

Table 4. Key structural indicators of the network.

	Community					Total
	A	B	C	D	E	
Number of members	11	5	12	11	6	45
Number of lactating cows	15	18	16	25	25	20
Milk production (t/farm/year)	49.0	74.0	92.9	132.8	160.2	100.8
Innovation use						
Free-stall housing (% of farms)	20	0	20	60	80	38
Total Mixed Rations (% of farms)	0	0	0	20	0	4
Proportion of cows taken to summer pastures (%)	100	100	100	100	33	100
Age of farmer (years, mean \pm SD)	60 \pm 14	50 \pm 12	52 \pm 11	42 \pm 13	34 \pm 8	48 \pm 13
Date of joining the cooperative (year)	1987	1982	2006	2002	2007	2002
% of members on the cooperative's board of directors	10	40	20	30	30	22
Distance to the cooperative (km)	11.9	2.6	2.4	2.7	2.3	2.7
Density	0.22	0.50	0.20	0.38	0.53	0.11
Reciprocity	0.30	0.40	0.37	0.67	0.50	0.30

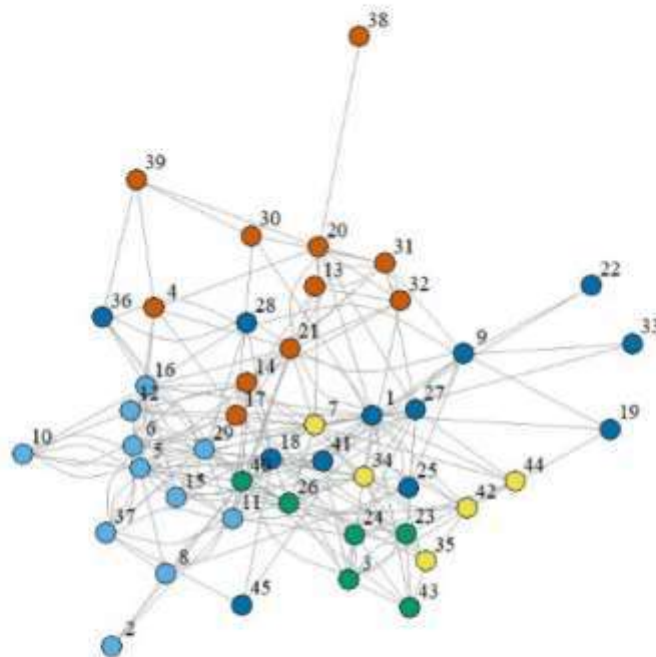


Figure 5. Community partition of the advice network using on the Louvain method.

The number of members assigned to each community ranged between 5 and 12, showing that no group is markedly dominant in size. Members of communities D and E operate farms with higher herd sizes and total milk production levels, and make greater use of technical innovations than the other communities. They differ in that farmers of group E have almost abandoned the practice of moving lactating cows to summer farms. Members of communities A, B, and C operate farms with smaller herd sizes, have low to intermediate total milk production levels, and make no or low use of technical innovations. On the basis of these features, we can divide the five communities into two groups. Communities D and E, which together have 17 members, can be called “intensive,” while communities A, B, and C, which have a total of 28 members, can be characterized as “traditional.” The producers of the “traditional” communities tend to be older than those of the “intensive” communities, among which group E has the youngest members.

Among the “traditional” communities, length of membership of the cooperative differs between the producers of A and B, who have been members since the early years of its founding, and the producers of C, who have recently joined. Other factors differentiating the various “traditional” communities are distance from the cooperative and political participation, defined as being a member of the board of directors. Members of A are located a long way from the cooperative, with 10 out of the 11 in Canal San Bovo, and have the smallest share of members on the board of directors, while those of B and C live much closer to the cooperative and have, especially B, greater representation on the board of directors. The two “intensive” communities are located near to the cooperative, and they both have the same, intermediate, numbers of members on the board of directors.

4.2.3. Exponential Random Graph Model

The model retained reciprocity and the transitive triads as endogenous attributes that have an effect in shaping the network (Table 5). The reciprocity and geometrically weighted edgewise shared partner (GWESP) terms (which capture the tendency of transitivity) are significant and positive. This indicates that trust among members plays a role in structuring the advice network. Concerning the exogenous attributes, the model retained locality, seniority in the cooperative, the number of cows,

and the distance between the nodes of a given edge. However, their values are low and have little effect on the model, except for locality. The farm's level of production was not significant. This shows that few external attributes explaining the shape of the advice network were retained. Formal status does not seem to play a role in the formation of advice ties. Moreover, no homophily played a role in the structure of the advice network, which means that producers that are in some way similar do not create significantly more advice relationships with each other. The model's goodness of fit parameters are presented in the Supplementary Materials (Figure S1).

Table 5. Estimated coefficients and standard errors for the parameters of the final exponential random graph model.

Variable		Estimates
Endogenous	Edges	−9.84 (0.28) ***
	Mutual	0.88 (0.006) ***
	GWESP (decay = 0.5)	0.77 (0.002) ***
Exogenous	Locality 2	−0.27(0.005) ***
	Locality 3	−0.45 (0.006) ***
	Locality 4	−0.28 (0.005) ***
	Locality 5	−0.29 (0.006) ***
	Seniority in the cooperative (icov)	−0.006 (0.0001) ***
	Number of cows	0.03 (0.01) *
	Farm production	−0.0003 (0.0001)
	Distance	−0.00004 (0.00002) *

Parameter estimates are expressed in log-odds with their standard deviations (SD) in brackets. * P < 0.05; ** P < 0.01; *** P < 0.001. GWESP = geometrically weighted edgewise shared partner.

5. Discussion

In this study, we analyzed relational processes using quantitative and qualitative methods to study collective action among members of a dairy cooperative, committed to the joint production of high-quality mountain cheeses. By forming dairy cooperatives, producers in the province of Trento are able to generate a higher price for milk than in the plains through the production of prestigious cheeses, thereby providing greater economic sustainability to the local population [25]. The price paid to producer members of the Primiero cooperative for their milk was the highest out of the 17 cooperative members of the Concast-Trentingrana consortium, the result of successful collective action. In this section, we will present those elements that help us to understand this success, as well as those that constitute possible threats to the collective dynamics.

Firstly, we have shown that the relationships of trust between the members are strong. Trust is a central element in coordinating collective action to develop and promote high-quality cheeses. In this study, trust is both community-based and organizational. It has developed over the long term through life in villages, collective management of alpine pastures, and the early creation of cooperatives. Moreover, frequent face-to-face interactions, that can be formal during assemblies or informal for example in cultural events, allow strengthening trust.

Next, we found that trust toward other actors involved in the value chain was even higher than trust between members, especially toward the organizations providing the cooperatives and producers with advice and services. This is important, as it facilitates the creation of joint projects to develop and promote cheese, as demonstrated by Torre [6] in the case of *Comté* cheese, and De Roest and Mangi [54] in the case of *Parmigiano Reggiano* cheese. In addition, coordination between producers and actors in the tourism sector seems to be crucial in increasing awareness of high-quality cheeses [36]. However, trust toward the provincial government and municipal authorities was at some of the lowest levels, even though their values were around 7. Nonetheless, political support from authorities of different levels, especially provincial, appeared to be decisive in accomplishing collective action (e.g., subsidies, technical support, labels). In this sense, Pachoud et al. [8] have shown that lack of support

from political authorities of different levels played an important role in the failure of collective action to develop and promote cheese in Southern Brazil.

We went on to point out that the main conflict among members was related to some of them intensifying production. The producers who raised this issue stress the need to produce high-quality milk with their own forage instead of large quantities of milk using imported feed. This is at the very heart of the process of differentiation through construction of the link between territory and product quality [2]. In this regard, local actors were able to make their own institutional arrangements to limit internal competition among members linked to intensification through the introduction of milk quotas in 2019.

The network analysis of informal advice among members showed that the president of the cooperative was the most prestigious member, and therefore has the role of leader. The president of the cooperative also had the highest betweenness centrality, along with four other members. These members are important for collective action as they facilitate cohesion and the flow of information within the network [49].

With regard to structural indicators, we found that the advice network had high levels of density and reciprocity, and, moreover, no isolated nodes. Such network structures are fundamental to the success of collective action. The cooperative studied here appears to have an appropriate size, i.e., number of producers, to enable regular face-to-face interactions, thus generating a network with high density and reciprocity, and an absence of isolates.

With regard to the fragmentation of the network, five different communities of producers were identified: Three were characterized as “traditional” and the other two as “intensive,” based on farm size, production and management practices, and age. The variability in practices seems to engage mechanisms of social aggregation among similar individuals. Darré [55] showed that practices are mastered collectively among peers that share common perceptions, which in turn helps build a system of common norms. “Intensive” producers, who are younger and make greater use of technical innovations, can be instrumental in increasing intensification in the future, as older members cease their activity. However, these differences in practices and representations can lead to conflict, as highlighted by the conflict assessment, which can pose a threat to the collective dynamics. Nonetheless, in addition to their capacity to make their own regulations (i.e., milk quotas) in order to resolve conflicts, members are able to bring together a diversity of practices and perceptions. Indeed, among the 10 members of the board of directors, five belong to the “intensive” communities, and five to the “traditional” communities. The analysis went on to point out that geographical isolation tends to inhibit participation in collective action, which can be a threat to its success. Indeed, members located in Canal San Bovo, who form a community, are less involved in the political life of the cooperative. Only one producer is on the board of directors. They also attend fewer general assemblies: Of the six members that do not participate in every assembly, three are from Canal San Bovo. Mountains can exacerbate isolation because of limitations in the transport infrastructures as well as in information and communication technologies [56]. Including every actor in the collective dynamics appears, therefore, to be more challenging in mountain areas, and, here, leaders can play a central role in integrating isolated members. Nonetheless, isolation tends to slow the adoption of innovation and, in our case, intensification, witnessed by the community furthest from the cooperative having the lowest production level. In this regard, Zottele and Delay [57] have shown that isolation due to the mountain environment in the province of Trento can cause pockets of resistance to innovation.

The ERGM showed that reciprocity and transitivity were the endogenous variables explaining the structure of the advice network. These variables show that trust comes into play. While reciprocity demonstrates mutual engagement between two individuals, transitivity is the pattern of the relationship between three individuals that conforms to the schema: If A is in relation with B and C, then B is in relation with C [10]. This strengthens the results obtained from the trust assessment. The results regarding the external variables allow us to explore more deeply and compare the effects of geographical and organized proximity. Concerning the similarity logic of the organized

proximity, no external attributes, including homophily, were significant in structuring the network. This shows that socio-economic status does not play a role in the formation of advice relationships. However, the Louvain method identified five communities whose members have similar practices and personal attributes. This suggests that, despite the higher density of exchange within communities, this was not significant in the ERGM. In fact, the high overall density indicates strong cohesion and interdependencies among the communities identified within the cooperative [47]. This shows that the members interact horizontally, which may sound like a non-hierarchical society, as defined by MacDonald [58]. This author shows that these societies are characterized by voluntary cooperation, which leads to equivalent levels of cooperation and equality between the individuals. In the present case, voluntary cooperation among members was demonstrated when there was a fire on a farm in 2018. The other members immediately mobilized to help the family and remove the cows to other farms. Concerning geographical proximity, the location of the members appears to be the only significant external attribute. In fact, the ERGM revealed that the producers who are most sought for advice are those who live in Transacqua, which is the closest locality to the cooperative and therefore has a central position.

To sum up, it appears that the similarity logic of organized proximity acts as a lever for cooperation. Members seem to interact horizontally, without hierarchy, and the high level of participation in cultural events appears to be instrumental in strengthening the similarity logic. However, geographical isolation may be a limit to cooperation, as the most isolated members seem to be less involved in the collective dynamics, whereas members in the locality closest to the cooperative appear to be more active in the network. It seems important, therefore, to reduce functional distances among members, for example, by strengthening communication among them and encouraging greater participation on the part of the most isolated. This role can be played by the president, who enjoys a high level of popularity, and the other actors with a high betweenness centrality, as they facilitate cohesion and information flow.

Dairy cooperatives in mountain areas provide local populations with the possibility of increasing their income [25]. Moreover, they have a central social and environmental role, as they allow traditional farming systems and landscapes to be maintained, and foster biodiversity and other environmental benefits [59–61]. In this regard, dairy cooperatives can contribute to the sustainable development of mountain areas. Nonetheless, sustainability depends on the local actors' capacities for self-organization and collective action. The CPR and TP frameworks appear to be promising means of better understanding the relational processes of collective action in dairy cooperatives producing high-quality mountain cheeses, from a social and geographical point of view. Future directions would consist in extending the research, especially to the political dimension relating to the hierarchy among members, and to the issue of geographical isolation and the level of participation in the collective dynamics. Finally, some limitations of this paper need to be mentioned. For all the members of the cooperative, the farm milk production provides the most important share of the income and therefore the producers' economic concerns were not explicitly analyzed, under the assumption that the revenue was indicated by the farm size and production. We suggest that further studies should verify whether more accurate economic indicators (e.g., farm income differentiation and statement) could improve the understanding of the structure and the position of the members in the network. In addition, due to our small case study dataset, this approach should be extended in other cooperatives and at different scales in order to support our results and/or to identify further elements of success or failure of collective action. Last but not least, the Louvain method was chosen for the community detection, because of its high performance. However, it is important to note that other algorithms may result in other community boundaries.

6. Conclusions

The relational approach combining the CPR and TP frameworks based on trust and conflict assessment and SNA were found to be appropriate tools for studying collective action for cheese differentiation by the Primiero cooperative. Within the cooperative, we showed that the success

of collective action was linked to cohesive and regular interactions, which lead to high levels of reciprocity, and community and organizational trust among members. Our analysis also revealed a conflict linked to the different production systems, which saw “traditional” producers in opposition to “intensive” producers. However, the members were able to resolve the conflict through their own institutional arrangements (i.e., milk quotas) and by bringing each point of view into the discussion (i.e., parity in the board of directors). We then showed that formal status does not seem to play a role in advice relationships, and that members tend to have non-hierarchical relationships. Moreover, participation in cultural events appears to be instrumental in increasing the similarity logic of organized proximity among them. However, the geographical isolation of some members can be an obstacle to their participation, and it is therefore crucial to ensure that everybody has access to information and is integrated into the collective dynamics. This task can be undertaken by the president, who enjoys a high level of popularity, and the other actors with high betweenness centrality, who play a central role in cohesion and information flow. At the territory level, our analyses showed that good relationships among the actors involved in the value chain, which includes the tourism sector, are crucial to the success of joint projects for developing and promoting cheese by integrating knowledge, competencies and ideas from different areas. Lastly, higher administrative levels are important for the support they provide to collective action locally by offering legal frameworks and infrastructures for producing, improving, and promoting cheese. Further policy initiatives, mainly at the provincial scale, could be implemented to enhance collective action, for example by supporting collective rule design, by providing arenas for conflict resolution, or by promoting further partnership between the different stakeholders, including tourism. To sum up, successful collective action in dairy cooperatives in mountain areas allows them to specialize in high-quality cheeses and related services, which ensures increased income for the local population, while at the same time maintaining traditional farming systems and landscapes and thereby contributing to the sustainable development of these marginal regions.

Supplementary Materials: The following are available online at <http://www.mdpi.com/2071-1050/12/11/4596/s1>, Figure S1: Goodness of fit of the statistical model and results for indegree, outdegree, edge-wise shared partners, dyad-wise shared partners, triad census, and minimum geodesic distance parameters of the directed advice network among the members of the Primiero cooperative (AIC=1260), Table S1: Variables selected for the ERGM of the advice network.

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Supplementary materials

Table S1. Variables selected for the ERGM of the advice network.

	Terms		Process	Hypothesis
Structure variables (endogenous)	Edges		Density (base term)	The probability of there being a link corresponds to the density of the network
	Mutual (reciprocity)		Mutually linked partners	One actor linked to another tends to result in a mutual advice relationship
	GWESP (transitivity)		Outgoing Two-path ("OTP") or "transitive shared partner"	Two actors linked to a third tend to establish advice ties according to the schema $i \rightarrow k \rightarrow j$
Exogenous variables	Attributes reflecting the formal status of the producers	Age	Age of the member	Producers with a higher formal status are more likely to be sought for advise / With respect to homophily, producers with the same attributes tend to form denser advice relationships
		Level of education	Superior	
		Seniority in the cooperative (+ homophily)	Member since before 2000 (vs after 2000)	
		Position in the cooperative (+ homophily)	Members on the board of directors (vs members not on the board of directors)	
		Farm production	Quantity (t) of milk produced per year per farm	
		Level of intensification (+ homophily)	Intensive system (cosmopolitan breeds, free-stalls, Total Mixed Rations) vs traditional system (less productive breeds, tie-stalls, separated feed delivery)	
		Number of cows	Number of milk cows	
		Farm size	UAA (in ha)	
		Proportion of lactating cows taken to summer farms	% of the herd	
		Geographical attributes	Locality (+ homophily)	

Distance from the farm to the cooperative

In km

Distance (independent dyadic phenomena)

Distance between two actors of a dyad (km)

are more often sought for advice / With respect to homophily, individuals of the same locality tend to form denser advice relationships Individuals closer to the cooperative tend to be more often sought for advice Individuals who live close to each other tend to form more advice relationships

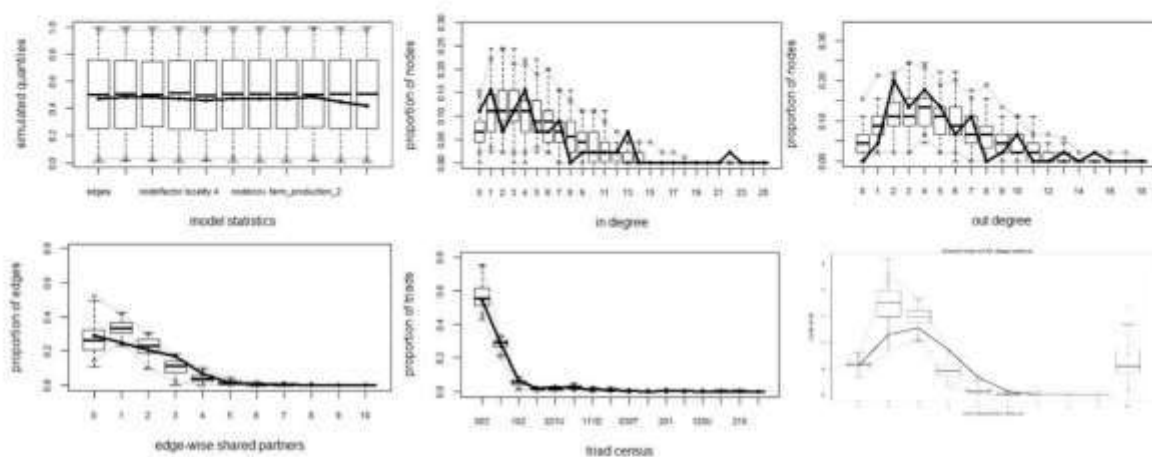


Figure S1. Goodness of fit of the statistical model and results for indegree, outdegree, edge-wise shared partners, dyad-wise shared partners, triad census, and minimum geodesic distance parameters of the directed advice network among the members of the Primiero cooperative (AIC=1260).

Identity, feeling of belonging and collective action in localized agrifood systems. Example of the Serrano cheese in the Campos de Cima da Serra, Brazil

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Abstract – The study is aimed at linking social representations of identity and feeling of belonging to territory of farmers, to their degree of involvement in collective action within localized agrifood systems (LAS). The study was conducted with producers' families producing Serrano cheese, in the mountains of the Campos de Cima da Serra, in southern Brazil. Collective action for the valorization of the Serrano cheese relied on the producers' associations, which are the only form of collective organization. Fifty-four families were selected according to their level of involvement in collective action. First, we used a quantitative approach called the free word association, analyzed by Factorial Correspondence Analysis. Second, we asked closed questions to the producers to assess their feeling of belonging. We showed that the content of the social representation reflected the participation of producers in collective action. Producers who put forward the typicality of the cheese, the territory and their identity, were the most engaged in the associations. On the other hand, producers not involved in associations put forward the difficulties of their activity. In this sense, it appears valuable to encourage discussion between the different producers according to their level of involvement to build common representations that favor collective action for the defense and valorization of the Serrano cheese. Nonetheless, most producers tended to show a high feeling of belonging which could form the basis for discussion. However, collective action in the LAS follows a top-down model led by extension services, in which the producers need to be integrated in a more participatory governance to lead more efficient projects.

Keywords: identity / feeling of belonging / collective action / localized agrifood systems / mountain cheese

Résumé – **Identité, sentiment d'appartenance et action collective au sein des systèmes agroalimentaires localisés. Exemple du fromage Serrano dans les Campos de Cima da Serra, Brésil.** L'étude a pour objectif de relier les représentations sociales de l'identité et le sentiment d'appartenance au territoire d'agriculteurs à leur degré d'implication dans l'action collective au sein de systèmes agroalimentaires localisés (SYAL). L'étude a été réalisée auprès de familles de producteurs produisant du fromage Serrano dans les montagnes des Campos de Cima da Serra, au sud du Brésil. L'action collective pour la valorisation du fromage Serrano s'appuie sur les associations de producteurs, qui constituent aujourd'hui la seule forme d'organisation collective. Cinquante-quatre familles ont été sélectionnées en fonction de leur degré d'implication dans l'action collective. Premièrement, nous avons utilisé une approche quantitative appelée association libre de mots, analysée par une analyse factorielle des correspondances. Deuxièmement, nous avons posé des questions fermées aux producteurs pour évaluer leur sentiment d'appartenance. Les résultats ont montré que le contenu de la représentation sociale reflétait le niveau d'engagement des producteurs dans l'action collective. Ainsi, les producteurs qui ont mis en avant la typicité du fromage, du territoire et de leur identité étaient les plus investis au sein des associations. En revanche, les producteurs non engagés au sein d'associations mettaient en avant les difficultés de leur activité. Ainsi, il semble utile d'encourager la discussion entre les différents producteurs en fonction de leur niveau d'implication afin de construire des représentations communes favorisant l'action collective pour la

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défense et la valorisation du fromage Serrano. Néanmoins, la plupart des producteurs ont montré un fort sentiment d'appartenance, ce qui pourrait ainsi servir de base à la discussion. Cependant, l'action collective au sein du SYAL suit un modèle top-down, menée par les services de vulgarisation. Il est donc nécessaire d'intégrer les producteurs dans une gouvernance davantage participative afin de mener des projets plus efficaces.

Mots clés : identité / sentiment d'appartenance / action collective / systèmes agroalimentaires localisés / fromage de montagne

1 Introduction

In a context of growing standardization of cultures and human mobility caused by globalization, we are seeing a strengthening of identities and the feeling of belonging in many territories (Di Méo, 2016). It is the case for most localized agrifood systems (LAS) producing mountain cheese, where territories remain strong anchor points (Chalas, 2009). The notion of LAS, based on a territorial approach, highlights the typicality and singularity of products and the know-how and identities of the communities (Muchnik, 1996; Fournier, 2008; Cañada and Muchnik, 2011). The territorial dimension is often an essential component of the process of identity building of communities in LAS, especially for the producers (Fournie, 2016). Indeed, territorial referents contribute to create or consolidate their identity by giving it a material, concrete and also an ideal support rich in images and symbols (Di Méo, 2016). The sense of belonging, called also *territoriality* (Brunet, 1990), appears as a subjective element of the identity and its measure allows assessing this land base (Di Méo and Buléon, 2005). In such LAS, many actions are done to promote the products, where particularities of the territory, know-how and people become more and more a specific resource, as shown by the rising use of labels linked to the origin and the quality of the products (Muchnik *et al.*, 2008; Pecqueur, 2009). In this way, we hypothesize that shared representations of identity and a strong sense of belonging to the territory facilitate collective action for the valorization of the products. Collective action refers to "the action taken by a group (either directly or on its behalf through an organization) in pursuit of members' perceived shared interests" (Marshall, 1998). In LAS, collective action can rely on the actions of diverse organizations, such as producers' associations in the case of this study.

The study was conducted in the Campos de Cima da Serra in southern Brazil. This mountain region holds the Serrano cheese production, a traditional raw milk cheese, produced by family farmers. Today, we observe an important increase in the demand of consumers for Serrano Cheese (Ambrosini, 2007), especially for young cheese of less than thirty days of maturation. However, this chain remains informal and cheese sales have become illegal, with producers being prosecuted for marketing their cheeses. Indeed, this product does not meet the sanitary standards for raw milk cheese because the Brazilian legal framework does not authorize the selling of raw milk cheese with less than sixty days of maturation. Also, national hygiene standards, adapted to big dairy industries, are incompatible with the reality of small-scale and artisanal production. In this context of informality, collective action and cooperation between the producers became necessary firstly

for the defense and the valorization of the Serrano cheese and secondly to convince the food safety policymakers to open new ways for their cheese production.

The study aimed at linking the social representations of the identity and the feeling of belonging to the territory of the Serrano cheese producers to their motivation to engage in collective action. Indeed, to our knowledge there is little research on the link between social representations and collective action and it offers a promising line of research to better understand collective action processes. Our study attempts first to analyze the contents of the representations of the identity of Serrano cheese producers and to measure their sense of belonging to the territory. Second, it seeks to determine which social representations lead to a higher engagement in collective action.

2 Social representations: a useful concept to interpret identities

2.1 Definition of social representation

Social representation is a social construction, common and shared, of reality. Jodelet (1989) defines representation as "a form of knowledge, socially elaborated and shared, with a practical aim and contributing to the construction of a common reality to a social ensemble". It does not correspond to an objective vision of reality but it is a socio-cognitive construction of it. This subjective appropriation of reality has an individual and collective dimension. These are the results of a set of specific social interactions shared by individuals of common categories. Social representations are built on cognitive processes, which depend on social conditions, cultural heritage and personal experiences. There are different representations for the same object according to the individuals of different populations or of the same population but with different characteristics (practices, resources, etc.), forming different groups of mental belonging (Michel-Guillou and Ehrlich, 2005). Abric (1994) defined four functions of representation in the dynamics of social relations: knowledge that explains reality; orientation that allows orienting the behaviors; justification of the positions and behaviors; and identity that allows the group to maintain its specificity. In fact, social representations contribute to the construction of individual and social identities (Moliner, 1993).

Research on social representations has highlighted a certain structure between the elements of the content (Abric, 1994). First, the central core integrates structural constants. These are implicit elements which determine the meaning of the representation and ensure compliance with the norms and

values of individuals within the social groups (Moliner, 2001). These elements provide stability of the representation over time. Then, peripheral elements are organized around this core. They play a role of interface between the central core and the reality. They allow the representation to adapt more easily to changes and preserve the central core of external influences. Nonetheless, social representations are dynamic, it means that they can evolve over time. Flament (1994) distinguished between reversible and irreversible situations, depending on whether a return to old practices is perceived as possible or not. If the situation is reversible, only the elements at the peripheral level will change. Whereas if the situation is irreversible, the social representation will be transformed. Flament (1987) used a set of empirical observations to propose a model to represent these dynamics. For him, practices are the main sources of transformation. Experimental studies are most often carried out *via* the theory of commitment (Kiesler, 1971). Moliner *et al.* (1995) showed that committing individuals in a context of freedom could bring important structural changes, both at the central and peripheral level.

2.2 The couple territory/territoriality to express identities

The concept of territory has gained a renewed interest in the last thirty years, especially in French geography (Brunet, 1990; Di Méo and Buléon, 2005). Territory, defined as “a developed area, socially constructed, culturally labelled and institutionally regulated” (Lopez and Muchnik, 1997), is seen as a deliberate appropriation of a geographical location (Brunet, 1990; Brunet *et al.*, 1992). This appropriation is at the same time economic, ideological and political (social therefore) (Di Méo, 1998). It is the result of actions of localized social groups (Brunet, 1990), and who assign a specific representation of themselves, their history, their singularity, therefore their identity (Di Méo, 1998; Di Méo and Buléon, 2005). Thus, territory is often a central component of identities (Di Méo, 2016).

Territory displays a triple nature as political space, lived space and substance of all action (Di Méo, 2008, 2014). Indeed, it combines the concrete and material dimensions, those of objects and spaces, those of social practices and experiences of everyday life and action, with the ideal dimensions of representations and powers (Di Méo and Buléon, 2005). Nonetheless, territory is often more abstract, ideal, lived and felt than visually located (Brunet, 1990), in which the representations constitute in reality the true producers of territories (Di Méo and Buléon 2005; Di Méo, 2016). Representations are identified by mediators (symbols, images, memories, etc.), embedded in objects, landscapes and places and built over long periods of time (Di Méo, 1998).

However, the notion of territory appears more and more insufficient to analyze the complexity and the dynamics of societies in their relation to space. The semantic blur and the polysemy of the concept in which the political dimension is often the only retained dimension, creates confusion and tends to discredit it as a scientific object (Di Méo, 2016). The notion of *territoriality* pretends to exceed these limits (Chalas, 2009). *Territoriality* is defined as “a system of relationships that a community, and hence an individual who belongs to it,

maintains with externality and/or otherness thanks to the help of mediators” (Raffestin, 1982). In other words, *territoriality* reveals the way in which everyone creates their relationship with the spaces they practice, represent and identify with (Di Méo, 2016), which is nothing other than the feeling of belonging (Brunet, 1990). It represents the effort of the individuals and communities to combine the three dimensions of the territory. So, *territorialities* express personal and collective identities, produced by territorial representations and expressed through identity mediators (Brunet, 1990; Di Méo and Buléon, 2005). These identities result from an interactive relationship with others in a social and spatial context. Their function is to make normal, logical and necessary the feeling of belonging to a group and a territory. It is the mean of legitimizing a group in a territory from which it will give material, ideal and symbolic resources. They form the major ideal link between human beings, their societies and their spaces (Di Méo and Buléon, 2005; Di Méo, 2016).

3 Materials and methods

3.1 The Serrano cheese and the Campos de Cima da Serra

The Serrano cheese is a traditional raw milk cheese, produced as a by-product of beef cattle farming in the Campos de Cima da Serra in the Rio Grande do Sul and in the Santa Catarina states. Sixteen municipalities within the state of Rio Grande do Sul and eighteen in the state of Santa Catarina produce artisanal Serrano cheese, together making up the Campos de Cima da Serra (Fig. 1).

Livestock farming is the prime economic activity in the area (IBGE, 2018). There are about two thousand producer families of Serrano cheese and for most of them cheese making is the principal economic activity (more than 50% of the revenue). More than 90% of the farms are small-scale family systems. The most common production system is an extensive mixed dairy-beef breeding; with dairy and beef cattle simultaneously on the same farm. Only a few cows in any herd are milked for producing cheese, others are left to provide milk for the calves to produce beef. The herds graze on the natural pastures all year round, supplemented by temporary grazing on improved artificial pastures. Only 3% of the farms producing artisanal Serrano cheese are considered as intensive farming, it means dairy system without beef production (Ambrosini, 2007). Table 1 presents the size and production per farm of a random sample of sixty-seven families producing Serrano cheese in the Campos de Cima da Serra.

However, the Brazilian legislation does not authorize marketing raw milk cheese with less than sixty days of maturation since law n° 1.283 came into force in 1952 through regulation n° 30.691 (Presidency of the Republic of Brazil, 1950, 1952). Most of Serrano cheese producers do not respect this restriction because consumers prefer young cheese over mature, and hence sell their products within less than thirty days, which makes the sales illegal (Cruz, 2012). Moreover, the sanitary norms in Brazil for dairy products do not consider the specificities of artisanal production, which are subject to the same sanitary standards and facilities as big dairy industries. Thus, it is impossible for small-scale farmers to comply with current legal standards because of the high costs

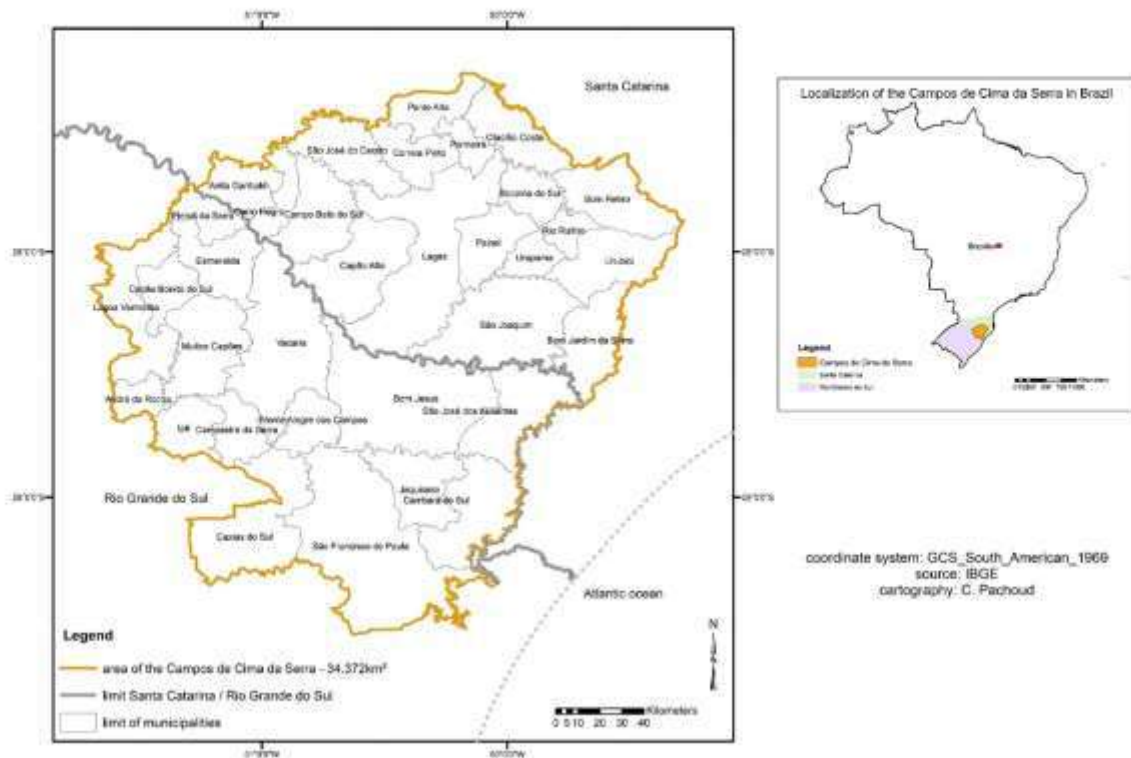


Fig. 1. Geographical area of the Campos de Cima da Serra.
 Fig. 1. Zone géographique des Campos de Cima da Serra.

Table 1. Average production and size of the farms producing Serrano cheese.

Tableau 1. Production et taille moyenne des exploitations produisant du fromage Serrano.

	Average	Minimum	Maximum
Number of cattle	90.6	14.0	800.0
Number of cows milked	14.4	3.0	40.0
Milk production (L milk/cow/day)	8.0	2.0	20.0
Cheese production (kg cheese/day)	10.5	2.0	70.0
Total area (ha)	132.2	6.5	980.0
Area of natural pastures (ha)	96.7	3.0	90.0
Area of improved pastures (ha)	17.5	2.0	70.0

of adaptation to food safety rules. Further, producers claim that the high standards have a negative impact on artisanal characteristics of the cheese, for example, as they are required to replace wooden molds with plastic ones. Besides, the illegality of sale, production of this cheese offers the potential for greater health risks for the consumer, as there is no sanitary control (Cruz, 2012).

In Brazil, regulation systems exist on different scales. First, the municipal inspection service (SIM) establishes and controls the sanitary norms for production and sale of the Serrano cheese, but only for mature cheese, ripened for more

than sixty days, within the area of the municipality. The inspection veterinarians employed by the prefectures of the municipalities control the health of the herd and the adequacy of the infrastructures. Today, less than twenty families have the SIM certification. Second, at the state level the law in each state was approved in 2016 and the decree was approved in 2017 in Santa Catarina and in 2018 in Rio Grande do Sul. However, still no producer has the certification to sell cheese within the state areas. Third, at the federal level there is still no legislation authorizing the Serrano cheese sales in all the country. In this context of informality, the majority of the artisanal Serrano Cheese is sold locally by direct sales to consumers or in small markets of the region (Cruz, 2012). Also, growing tourism in the region offers the potential of a new market opportunity for the producers.

In order to act for the defense and the valorization of the Serrano cheese, the first forms of collective organization emerged in the last decade through the creation of four producers' associations spread in twenty-three of the thirty-four municipalities. Their creation was mostly an initiative coming from the municipality extension services (EMATER-RS in Rio Grande do Sul and EPAGRI-SC in Santa Catarina). The first association of Serrano Cheese Producers – APRO-CAMPOS –, which gathers the municipalities of São José dos Ausentes and Bom Jesus, was created in September 2010. There are currently forty-two family members. Then, APROJAC was created in 2012 in the municipality of

Jaquirana. In 2017 the municipality of Cambará do Sul decided to join the association. Currently there are twenty-six family members. Then, in 2013, the APROSERRA was created, grouping the eighteen municipalities of Santa Catarina state. Today, more than seventy families are members of the association. Lastly, APROSÃOCHICO was created in 2016 in the municipality of São Francisco de Paula, today only six families producing Serrano cheese are members of the association. So, in Rio Grande do Sul, there are three associations spread in five of the sixteen municipalities, whereas in Santa Catarina, there is only one association gathering the eighteen municipalities. The existence of the associations has resulted in successful actions. First, the state laws and decrees were approved in 2016 in Santa Catarina and 2017 in Rio Grande do Sul for the marketing of Serrano cheese within the state areas. Then, state or private institutions like banks gave low interest loans to assist families who wanted to build farm dairies. Also, the protected designation of origin "Campos de Cima da Serra" was required to the National Institute of Industrial Property in August 2017, in order to protect the artisanal Serrano Cheese and recognize the typicality of this cheese, the territory and the know-how of production. Certification entailed four previous stages of research led by the extension services: historical recovery of Serrano cheese production; market and supply-chain assessment; product and process profiling; and characterization of the cheese's physical, chemical, sensory and microbiological properties (Vitrolles, 2011; Vieira and Dortzbach, 2017).

3.2 Data collection

Data were collected through three sessions of fieldwork in February 2017, August/September 2017 and March 2018. The sample of interviewed producers was defined at the beginning of the first fieldwork. We first selected six of the twenty-three municipalities where producer associations were located in order to obtain interviews from producers who were members of the four different associations. The municipalities are São José dos Ausentes and Bom Jesus for the APROCAMPOS association; Jaquirana for the APROJAC association; São Francisco de Paula for the APROSÃOCHICO association and Lages and Pánel for the APROSERRA association. The sample was defined thanks to the help to the extension agents of the six municipalities. We chose the extension services because it is the only institution which knows most of the producers as it is the only one which reaches them direct on the farm. They also attend regular association meetings and activities thus have a good knowledge of the level of involvement of each producer members. The extension agents provided the contact details of interviewees according to four different degrees of involvement previously defined, regardless of their production system. In total we interviewed fifty-four producer families direct on the farm. For twenty-three of the families interviewed, the woman and the man were present together; for seventeen interviews only the woman was present; and for fourteen only the man.

The four categories of involvement degree were the following:

- "important": corresponded to producers' families who are member of a producers' association and participate in

every monthly meeting. The producers can be member of the board of direction or not. The attendance is important for this category. Fourteen producers' families were in this group;

- "medium": referred to producer members of an association, who sometimes miss monthly meetings. Producers of this group are not members of the board of direction. This group gathered eleven families;
- "little": corresponded to producer members of an association, little engaged who are little present in monthly meetings. Fifteen families were in this category;
- "no": referred to producers who are not involved in any associations or who left the association. Fourteen families were in this group.

3.3 Word Association Method through Factorial Correspondence Analysis (FCA)

The word association method, developed by Ehrlich and Dervin (1999), is widely used by researchers to identify the content of social representations (Michel-Guillou and Ehrlich, 2005). This method is based on a questioning from an inductive word or a set of words, where each individual must indicate all the words or expressions that spontaneously come to their mind from this inductive word. The spontaneous nature of this phase allows rapid access to the elements constituting the semantic universe of the studied objects and thus to obtain the content of the representation (Abrieu, 2003). The ease of use and ease of understanding by the people explain why we chose to use this methodology in our study; which allow applying the tool to a wide range of individuals. Moreover, according to Ehrlich *et al.* (1997), the use of oral discourse seems to be one of the most appropriate forms for the study of social representations.

For this study, the inductive set of words was "identity of a producer of Serrano cheese". We asked the question: "could you cite up to ten words or expressions which characterize the identity of a producer of Serrano cheese according to you?" Nonetheless, the multitude of induced words cannot be submitted directly to the statistical method called Factorial Correspondence Analysis (FCA). We must first gather the words of the same meaning or semantically close under a common term. From these semantic groups, the FCA can be conducted to determine perceptions of the producers on the identity of a Serrano cheese producer. The FCA defines categories gathering individuals according to their affinities concerning the perception of each representation. The different categories were analyzed together with the involvement level in collective action of the producers. Data was analyzed with R version 3.5.1 using the FactoMineR extension dedicated to FCA (Husson *et al.*, 2018).

3.4 Feeling of belonging to territory

Regarding the assessment of the feeling of belonging we asked the fifty-four producer families, the two following closed questions:

- "Do you imagine living all your life in the Campos de Cima da Serra?" to which the producers could answer by "yes", "no", "I do not know";
- "Are you proud of your region?" to which the producers could answer by "yes", "no", "moderately".

Table 2. The different semantic groups with the most frequent induced words and the number of words according to the level of involvement in associations of the 54 producers' families.**Tableau 2.** Les différents groupes sémantiques avec les mots induits les plus fréquents et leur nombre suivant le degré d'implication dans les associations des 54 familles de producteurs.

Semantic groups	Most frequent induced words	Involvement degree				Total
		High	Important	Little	No	
Fulfillment	Love of the profession, quality of life, satisfaction, proudness, pleasure	11	12	16	18	57
Typicality	Localization, natural pastures, cheese flavor, climate, region, raw milk, particularity, typicality, Rio Grande do Sul	21	10	9	7	46
Tradition	Family, ancestors, history, tradition, know-how, culture, conservation, roots	14	13	13	6	46
Quality	Sanity, hygiene, cheese quality, cleanness	12	11	19	7	39
Subsistence	Savings, necessity, livelihood, revenue, survival, salary	6	8	9	12	35
Work	Whim, work, courage, devotion, effort, schedules, demanding	16	2	8	8	34
Legalization	Label, inspection, regulation, fine, law, hide, stolen, stamp	1	4	4	14	23
Identity	Man of the country, everyday life, small scale producer, owner, producer	7	4	6	2	19
Difficulty	Difficulty, sacrifice, high cost, problem, little value, without perspective	2	1	7	8	18
Singularity of the producer	We, own farm, producer's name, originality	3	0	2	0	5
Diversification	Diversification	0	2	1	1	4
Learning	Experience exchange, learning, qualification, social network	1	1	2	0	4
Market	Demand, market	0	1	2	0	3
Succession	Succession	1	1	0	1	3

4 Results

4.1 Word association method through Factorial Correspondence Analysis (FCA)

We obtained a total of 336 words from the fifty-four producers, it means an average of 6.2 words per family (ranged from 3 to 10). The different semantic groups, the most frequent induced words and the number of words according to the involvement degree in associations of the producers are presented in Table 2. The induced words with a low frequency of appearance (less than five) were removed for the FCA in order to obtain more robust results. This corresponds to the terms "market", "singularity of the producer", "learning", "succession" and "diversification". At the end, we had 317 words for the FCA.

The FCA was preceded of a Khi^2 test to test the independence of the two variables "representations" and "level of involvement in the associations". We found that the representation of the identity of Serrano cheese producers depends on the level of involvement in collective action of the producer ($\text{Khi}^2 = 54.7, f = 24, p < 0.05$). The result of the FCA is presented in the Figure 2.

Here, the objective is not to interpret the axes but to identify the producers' categories according to their representations. Nonetheless, it is important to note that the categories are not fixed and can overlap, but the idea is to represent the categories that are most representative of the ways of thinking. First, we observe an opposition between each category of involvement level of the producers, which are spread in each part of the graph. More precisely, producers a lot engaged represent themselves through the typicality of their cheese and their territory as well as their well-marked identity, but also by the need of devotion to realize their profession. All

the words related to territory were gathered in the semantic group "typicality" and only occurred in this group of producers. Then, for the producers moderately involved in collective action, the sanitary quality of the cheese and the maintenance of the traditions are important elements of their representations. After that, regarding the little involved producers, the fulfillment in their occupation is a central point of their representation; nonetheless they consider the Serrano cheese production as a subsistence activity. Last, producers who are not involved in associations have a negative perception of their cheese activity; they mentioned mostly the difficulties of the work and the illegality issue.

4.2 Feeling of belonging

Most of the producers showed a high feeling of belonging, whatever their level of involvement in collective action. Indeed, the large majority of the producers (fifty-three of fifty-four) answered that they want to stay in the region and are proud of it. Just one family set them apart, answering "I don't know" to the question related to the future in the region and "moderately" to the question related to the proudness of the region.

5 Discussion

The study showed that representations of the Serrano producer identity depended on the level of involvement in producers' association. The associations are today the only organization supporting collective action between actors of the LAS to defend and valorize the Serrano cheese. For the most involved ones, the typicality of the Serrano cheese, the territory and their identity are central in their representation. This

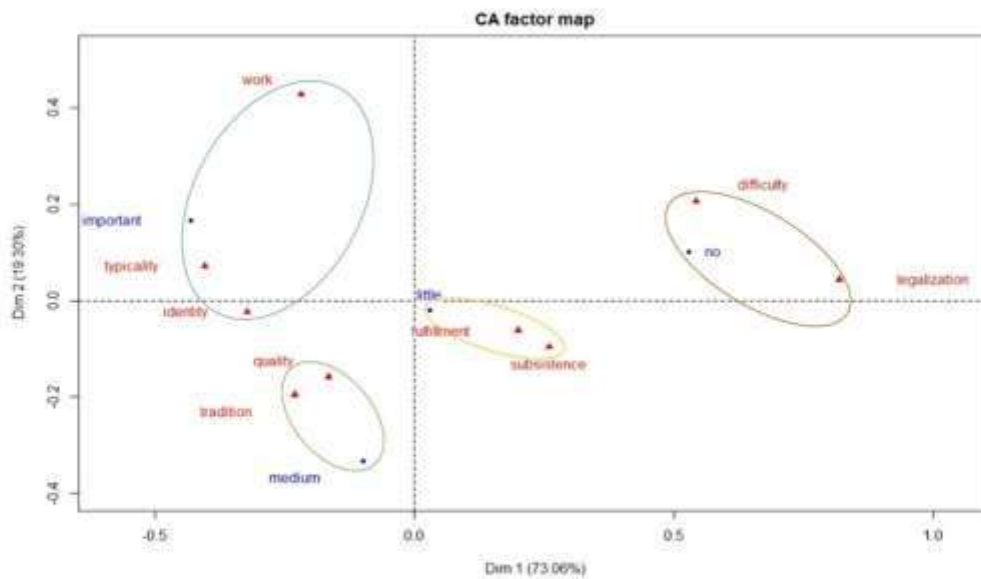


Fig. 2. Social representation of the Serrano cheese producer identity according to their level of involvement in collective action.

Fig. 2. Représentation sociale de l'identité des producteurs de fromage Serrano en fonction de leur degré d'implication dans l'action collective.

category also highlighted the efforts and devotion needed to realize their activity. Moreover, we observed that complying with the standards for the SIM certification is important for this group of producers. Indeed, seven families among the twelve of the sample having the SIM certification and three of the five in process of SIM certification belong to the "important" category. So, for this group, their investment in collective action to valorize the production to the market is higher than the others. Then, for the moderately involved families, the traditions and the sanitary quality appeared central in their representation. For this group, cheese production is also important, but to a lesser extent, their engagement is smaller. There is no SIM certified production and only two are in the process of SIM certification in this category. After that, for the little involved producers we saw that the fulfillment was high, but they considered the cheese production as a subsistence activity. The beef production is considered to be the most profitable activity. Producers not involved in associations have a bad representation of their identity as Serrano cheese producers. They brought forward the difficulties and legalization problems. This discouragement does not stimulate them to engage in collective action. They rely on the beef production activity. Similarly, Michel-Guillou and Ehrlich (2005), who linked farmers' social representations to their practices and position statements, showed that the most constrained farmers (e.g. dairy farmers) mainly referred to their work in terms of disadvantages.

Nonetheless, we observed that the feeling of belonging to territory was high for most of the producers, regardless of their level of involvement in collective action. However, results obtained from the word association did not show that the territory was a central component of the Serrano cheese producers' identity for the producers moderately, little and not engaged; whereas it was more important for producers a lot engaged. Indeed, references to territory were more relevant in

this category of producers, in which for example, they cited seven times natural pastures. Moreover, these producers also cited references linked to cheese typicality and to producers' identity next to the references to territory. These three dimensions gather the specificities of LAS based on the relationship between human/territory/product. This social representation, if shared by all the categories of producers, could support the development of common projects for the defense and the valorization of the cheese with higher engagement.

However, previous studies found that the extension services were the driver of collective action as they created the producer associations and they are central to their functioning (e.g. organization of the meetings). Collective action was built up on a top-down process, in which the producers were generally little involved. This could be a reason for the general weak participation from the producers in associations and the small number of members (Pachoud *et al.*, 2019). Vitrolles (2011) demonstrated also the top-down approach concerning the process of certification for the protected designation of origin (PDO) "Campos de Cima da Serra". Indeed, the extension services delimited the production area by the soil and climate conditions and defined the characteristics of the cheese and the process. The result was that the PDO appeared to be little understood by the producers. The present study showed that those producers who were highly active in the associations obtained the SIM certification to legally sell their cheese in municipal markets. In this sense, it signals the willingness to enter the formal market. But, producers often highlighted that certification standards change the traditional characteristics of the Serrano cheese, although the discussion for a recognition of the specificities of artisanal production in regulation in Brazil became central the last decade (Wilkinson *et al.*, 2016).

In sum, the study brought interesting findings on the link between representation of identity, feeling of belonging and collective action in LAS. However, as literature on this topic is missing, further studies are needed. Indeed, research on social representation seems to be a promising tool to engage discussion between actors and to find solutions to issues in the field of collective action and cooperation in LAS. In fact, the convergence toward common representations of their identity and their activity would facilitate the definition of common objectives and the implementation of projects.

6 Conclusion

The content of the social representation of the identity of Serrano cheese producers reflected their participation in collective action. For producers who put the typicality of the Serrano cheese, the territory and the producers' identity at the center of their representation, they were highly engaged in collective action for the valorization and the defense of the cheese. Producers who put the difficulties of the profession and legalization issues forward did not participate in collective action. Nevertheless, all the categories of producers showed a high attachment to their territory, although the territory was not a central component of their identity's representations, except for the producers a lot engaged. Thus, a discussion among the different producers' categories of social representations, based on the strong feeling of belonging, appears valuable in the objective to converge toward common representations to favor collective action. The representation of the producers a lot engaged based on references to the territory, the product and the producers' identity seems to be the most promising representation to obtain a high engagement in collective action for cheese valorization. However, actual collective action demonstrated a top-down process led by the extension services, in which producers were little involved. This could have significant risk for the traditional cheese and know-how, as valorization projects may lead to a standardization of the cheese and industrialization of the process, as showed for the PDO certification. In this sense, there is an urgent need to integrate the producers in collective action through a more participatory governance, in order to build common representations between the actors of the LAS. This would definitively lead to more efficient projects for the defense and the valorization of the Serrano cheese.

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