

Family farmers as agents of resilience in the western region of Santa Catarina (Brazil)



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Abstract: This article analyses how the resilience of family farmers has contributed to the development of the western region of Santa Catarina, Brazil. Despite having largest agro-industrial complex in Latin America, the region has faced cyclical crisis and challenges in recent decades. In fact, the quality of life of the rural population – the region is the main strongholds of family farming in Brazil – has not improved. Rural exodus, an aging population and the impairment of environmental quality are some of the evidences that point to the limits of the adopted agribusiness model. Family farmers and their organizations have responded to this socioeconomic environment of uncertainty with adaptive strategies based on local resilience, such as pluriactivity, productive diversification, transformation of raw materials in the property and production for own consumption. These strategies have served not only for the social reproduction of the group but also have contributed to a renewed regional dynamism.

Keywords: adaptability, rural resilience, resilient community, family farming.

La agricultura familiar como agente de resiliencia en la región occidental de Santa Catarina (Brasil)

Resumen: Este artículo analiza cómo la resiliencia de las explotaciones agrarias familiares contribuye al desarrollo de la región occidental del Estado de Santa Catarina en Brasil. A pesar de acoger un complejo agroindustrial con larga tradición en América Latina, la región ha sufrido crisis cíclicas en las recientes décadas. De hecho, la calidad de vida de la población rural no ha mejorado en esta región, que es la más importante del Brasil en agricultura familiar. La emigración rural, el envejecimiento de la población y la no consideración de la calidad ambiental son algunas de las evidencias que fijan los límites del modelo de los "agro-negocios". Los agricultores familiares y sus organizaciones han respondido a esta situación de incertidumbre socioeconómica adoptando estrategias que se basan en la resiliencia local, tales como la pluriactividad, la diversificación productiva, la transformación de materias primas en la explotación y produciendo para el autoconsumo. Estas estrategias han servido, no únicamente para la reproducción social del grupo, sino también para revitalizar el dinamismo en esta región.

Palabras clave: resiliencia, adaptabilidad, resiliencia rural, resiliencia de la comunidad, agricultura familiar.

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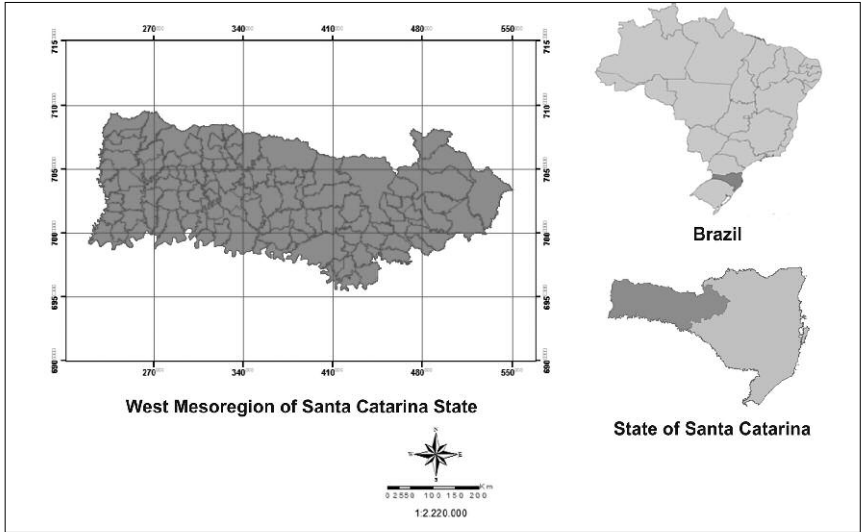
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Introduction

How do different communities react and restructure themselves when facing economic crisis? Why are some communities able to adapt and answer positively to problems whilst others perish? At different times in history, authors from varied academic backgrounds have faced the challenge to understand the reasons and factors behind these adaptive capacities. In this article, we take upon this challenge, discussing how rural communities in the South of Brazil have persistently managed to find positive solutions when faced with vulnerability due to several economic crisis.

We look particularly at the Western region of the State of Santa Catarina (figure 1), a region known for its large agro-industrial complex and home to one of the biggest meat processing plants in South America and for housing the largest number of family farmers in Brazil. They are the most emblematic social segment in the region and well known for their capacity to face and succeed crises after crisis (see for example Testa *et al.*, 1996; Mello, 1998; Mior, 2003, amongst others).

*Figure 1.
Location of the western region of the state of Santa Catarina*



The western region of Santa Catarina occupies approximately 1/3 of the state and has a population of 1.2 million inhabitants, 340 thousands of which live in rural areas. The historical presence of the largest agglomerations of family farmers¹ in Brazil partly explains this regional vocation for meat and dairy production. The large agro-industrial complex source their raw material mainly from integrated producers² and local cooperatives.

The state of Santa Catarina has an area of 95 thousand Km² and a population of 6.5 million people. It is the state with the fourth highest Human Development Index and

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- 1• We draw from Lamarche's (1993) concept of family farming. For him "family farms are agricultural production units in which the property and the work are closely connected with the family". Family farmers are, according to him, holders of traditions based on family values, on modes of production and on a way of life. However, as part of and influenced by modern global societies, they are also adaptable to modern ways of producing and consuming.
 - 2• This is a partnership system between agro-industries and independent family farmers. The agro-industries provides chicks and all the other inputs (feed, veterinary supplies and services, and transportation for the birds to and from the farm) and the farmer, generally, provides housing facilities and labour.

the sixth highest GDP in Brazil (see table 1). It has a diverse economy, with well-developed industrial, agricultural and services sectors (see table 2). Santa Catarina is the biggest exporter of pork in Brazil (and Brazil, the 4th in the world) and the second exporter of poultry (FIESC, 2013). Food and drink, textile and clothing, metallurgy and metal products and furniture are the most important industrial segments. In the national market, the state is the main producer of garlic, apples, honey, onions and pork. Tobacco, rice, banana, beans and corn are also important agricultural produce. Other significant economic activities include tourism and port handling.

Table 1.
Selected socioeconomic indicators – Brazil and Santa Catarina

Place	Human Development Index		Per capita GDP	
	Absolute value	Ranking amongst Brazilian states	Value (US\$)	Ranking amongst Brazilian states
Santa Catarina	0.773	4 ^o	14,700	6 ^o
Brazil	0.739	–	11,800	–

Source: IBGE, 2013.

Table 2.
GDP composition – Santa Catarina.

Activity Sector	Added additional value, by economic sector
Agriculture	6.7%
Industry	34.1%
Services	59.2%

Source: IBGE, 2013.

In order to analyse how family farmers have contributed to the development and resilience of the western region of Santa Catarina we first try to understand the main adaptive strategies adopted by them to overcome several crisis. For that end, we undertook a literature review on resilience, complemented by existing academic

research and official data by government agencies. Apart from this introduction and final remarks, this article has four main parts: the first brings an overview of the role of family farming to the development of Western Santa Catarina. The second part explores the notion of resilience applied to rural communities; the third relates to the crisis in this region and the last part characterises family farmers as agents of regional resilience.

The role of family farming in the development of Western Santa Catarina

Family farming, here considered as a socio-productive segment managed and operated by the family and predominantly reliant on family labour, is present in various regions of Brazil. In the West of Santa Catarina, family farming accounts for over 90% of the 100.000 farms in the region. Their origins are from families who migrated in the nineteenth century from Italy, Germany and other parts of central Europe and become settlers in several areas in southern Brazil. These migrants settled in unoccupied lands granted by the Brazilian government. These granted territories were near borders with neighbouring powers and was part of the plan to consolidate the Brazilian Empire territory. According Plein and Schneider (2009), the "*colonos*" (settlers) who settled in southern Brazil developed a "colonial way of life", comprised in the opinion of the authors of the following: a form of work and production organization based on a mixture of agriculture, trade and crafts, aiming primarily at the reproduction of the family unit.

It was a group of researchers at the Research Centre for Family Agriculture (Cepaf/Epagri) (TESTA *et al.*, 1996) who first presented the thesis that, despite the adverse natural conditions, the distance from major markets and infrastructure problems, family farming has had a major role in the formation of the largest agro-industrial hub of Latin America. Even so, there is a lack of studies on the ability of family farmers to face crisis and their capacity to restructure their production at a regional level. From a theoretical point of view, the resilience approach seems to be a very promising theoretical framework for performing this analysis (Hudson, 2009; Pendall *et al.*, 2009; Simmie and Martin, 2010; Glover, 2012; Darnhofer, 2014).

The resilience of rural communities

The term "resilience" comes from Latin word "*resilire*" denoting the idea of "bouncing back" (Simmie and Martin, 2010). In the social sciences, the concept was introduced by anthropology, alluding to the hypothesis of an "adaptive flexibility" of traditional communities in their encounter with modern society, which delimited it conceptually as an analytical resource for structuralist approaches (Darnhofer, 2014). Part of the literature derived from a functionalist view, beginning to accept the notion of resilience as the capacity of a social-ecological system to absorb disturbance and reorganize while being subjected to the forces of change, being able to keep the bulk of its functions, structure, identity and feed-backs (Walker *et al.*, 2004; Hopkins, 2008 and Hudson, 2009).

In the light of these ideas, resilience is a dynamic social process, determined in part by the ability of communities to act collectively and solve common problems (Norris *et al.*, 2008, Magis, 2010; Smith *et al.*, 2012). A resilient community, according to Norris *et al.* (2008), is a process linking a set of networked adaptive capacities to a positive trajectory of functioning and adaptation in constituent populations after a disturbance.

Economic cycles and crises are part of the daily life of rural communities. Farmers have always had to find solutions to address unexpected events related to the environment (hail, frost, drought), as well as economic and market uncertainty. However, according to Glover (2012), increased competition, globalization and environmental changes have increasingly demanded more adaptive responses from the family farmers.

However, in practice, measuring resilience has been a major challenge, as argued by Christopherson *et al.* (2010), Foxà *et al.* (2011), Méndez (2012), among others. Darnhofer *et al.* (2010), when discussing the resilience of agricultural systems, argue that these are very complex and variable in time and space, which makes it difficult to measure resilience objectively and accurately. To these authors to measure resilience in complex systems is like aiming at a moving target. Cabell and Oelofse (2012) agree with Darnhofer *et al.* (2010) and suggest that alternative qualitative approaches, which could identify the adaptive capacity of farmers and their organizations, are the most promising, since the theory of resiliency still lacks reliable quantitative indicators. Furthermore, Foxà *et al.* (2011) agree with Darnhofer *et al.* (2010) and Cabell and Oelofse (2012) on the methodological difficulties of measuring resilience and the importance of qualitative methods. Both these

authors suggest the adoption of a "case study" methodology. Such studies either used a historical approach - analysing adaptive processes over time in a selected territory - or employed a shorter-term comparative approach.

Darnhofer (2014) points out that the ability to adapt is a latent characteristic of the system that needs to be activated to effect change, and not as an automatic response. As for Paniagua (2013) resilience of a farming community is the sum of all adaptive strategies adopted by farmers. Foxà *et al.* (2011) contribute to this discussion stating that studies on resilience have predominated been in metropolitan areas and in some cases in broader territorial spaces, but still being very scarce in rural areas.

There has also been efforts in the resilience literature, to bring in theoretical elements that might help to explain what differentiates resilient territories. Among these elements are: "social capital" - which involves cultural and organizational dimensions linked to local specific resources (Christopherson *et al.*, 2010; Méndez, 2013); "diversity" - which reduces the vulnerability of local economies to external shocks (Darnhofer, 2014; Foxà *et al.*, 2011); "innovation" - which allows a region/territory to be more able to use strategic resources, adjust and adapt over time (Christopherson *et al.*, 2010; Méndez, 2012 and 2013) and "connectivity" - which relates to territories with a number of internal connections that can better withstand shocks (Simmie and Martin, 2010; Darnhofer, 2014).

Historical formation of Western Santa Catarina and its crisis

Western Santa Catarina's social and economic formation is marked by four distinct phases. Until the 1930s, much of the existing population were peasants from black and indigenous origins (Nodari, 2009) who practiced subsistence agriculture as well as timber and *erva-mate* extraction. These peasants did not have land ownership and the farming they practiced had little integration with the national economy (Testa *et al.*, 1996). It was the timber extraction industry, which eventually provided the basis for early industrialization in the region. On its turn, other economic activities largely benefited from the capital accumulated by this early industrialization.

The second phase lasted between the 1940s and 1965. During this time, the timber industry declined and the agro-business capital evolved. Agricultural production changed to a hierarchically subordinate pig farming polyculture. That is, most other

farm activities lost economic importance to pig farming (Testa *et al.*, 1996) a key input for the emerging agribusiness. New farmer-agroindustry relationship developed in the form of a full-cycle production system. In this system, farmers were responsible for the whole production process of rearing the pigs. They either planted the corn, soybeans and other inputs for raising the animals on their own agricultural establishment, or sourced them from local market. This gave them some autonomy in the production process, since they were practically independent from external resources and inputs to raise their livestock. Farmers could also obtain higher profits per output unit without having to worry about offering the agroindustry a minimum scale of production (Ferrari, 2003). There was also a rise in migration to the region, due to the multiplication of units of family farming pig production.

A series of important changes happened in this third phase, which lasted from 1965 to the early 1980s. For a start, this is when the modernization of agriculture (green revolution) changed the technical basis and productive organization of rural areas not only in this region but also throughout the world. In the region, a concentration of agrobusiness capital allowed the formation of six major conglomerates - Sadia, Perdigão, Aurora, Seara, Chapecó Alimentos and Ceval (Ferrari, 2003). This, on its turn, led to the consolidation of the labour market and rise in the urbanization near the agroindustry centres. Furthermore, the agricultural frontier, which had already shown signs of exhaustion during the previous decade, reached its limits during these decades. Combined with the constraints imposed by the geography of the terrain, it created greater difficulties for the horizontal expansion of the properties.

This process led to the search of new frontiers, with families migrating to the State of Paraná and the North West and Centre of the country. It is also important to note that it is at this stage that agro-industries put in place a series of new procedures and requirements for farmers to follow, causing significant changes in rural areas during the years that followed.

Finally, we have the fourth phase from the beginning of the 1980s to present day. This phase has two clearly defined periods. The first period starts in the early 1990s and it is when profound changes in the relationship between the agro-industries and family farming happens. First, agro-industries begin to diversify their production to attend the demand of customers - from both internal and external markets - in terms of quality and variety of products. Secondly, the process of integration of farmers/agro-industries intensified, with increasingly control by the agro-industries over the production system. Thirdly, agro-industries implemented measures to tighten the control over the entire production system, with research and technical assistance to match (Colleti, 2009). This

process triggered the exclusion of many farmers integrated into this system, and led many of them into crisis.

Opening the economy - in the 1990s - affected the whole agro-industrial production structure. This led to an "intensification in scale and therefore the concentration of production, [leading to] the exclusion and crisis of a significant part of family farming from the integration system" (Mior, 2003). On the other hand, it is during this period that social movements linked to farming communities began to search for alternatives, building their own agro-industries, cooperatives, associations, as well as becoming active actors in the formulation of public policies that could benefit this community. It is important to stress that this article focuses on these last phase and therefore, we think it is important to build a better understanding of what happened.

The new development model implemented after the 1980s was responsible for transforming the region as a reference in technological innovation in the production and industrialization of pigs and poultry, enabling the region to house the largest production, slaughter and processing meat complex of this kind in Brazil and Latin America. However, this development model has had many flaws. For one, the economic growth it promoted was largely concentrated in the region. Pig manure polluted water sources and the young rural population continued to flee the area in search of better opportunities leaving behind and ageing countryside (Mior, 2007). Although the total pig production remain the same, the number of farmers integrated into the system dropped systematically. From around 67,000 existing pig farmers in 1980, about 30,000 remained in 1990, 20,000 in 1995 and in 2002, this number had decreased to less than 15,000 (Lins and Coletti, 2010). All this led researchers like Testa *et al.* (1996), Wilkinson (1996), Mello and Schmidt (2003), Lins and Coletti (2010), among others, to suggest the existence of a regional socioeconomic crisis.

However, the same process of change that excluded most farmers from commercial pork production led many to incorporate new alternatives for survival, such as pluriactivity, productive diversification and the use of artisan/hand processing methods in their rural properties. Although the big agro-industries are the ones who historically have had direct and indirect government support, family farmers have managed to find alternatives and adapt. By doing so, they not only guarantee their own social reproduction as a social category but they also play a fundamental role in making the region more dynamic and resilient.

As argued by Magis (2010), the resilience of a community does not related to the ability to control the conditions that affect this community, but rather, on individual and community capacity to respond to changes. So much that, according to McManus *et al.*

(2012) rural communities tend to have a sense of identity and social participation that attenuates processes of crisis. There is a sense of belonging, a social capital that contributes to this resilience. Indeed, according Darnhofer *et al.* (2010), systems of family agricultural production tend to be complex and adaptable. That is, if in the past the regional development of Western Santa Catarina was leveraged by relationships established between agroindustry and family farmers, today, against all odds, family farmers and their organizations remain an important link to the success and economic dynamism of this space.

Family farming as an agent of regional resilience

As we have seen, family farming has been important to the development of Western Santa Catarina. An important strategy employed by family farmers since the beginning of the colonization has been to diversify their own production. Despite current specialization trends fostered by agro-industrial integration (especially with pork and poultry) productive diversification remain present.

The modernization process that occurred between 1980s and 1990s, not only promoted the exclusion of a large portion of traditional farmers, but also separated the remaining into two groups: those who could keep up with technological and productive patterns of integration and those who were unable to do so. Alternative strategies to the agro-industrial integration were regarded with reserve, and in practice, had little chance of success (Mior, 2007).

However, people do not experience the arrival of modernity as a disintegration of their old worlds, marked by the establishment of new and pure codes of communication and unproblematic rationality. Rather, they visualize reality as being made of mixtures of imagined and fulfilled experiences that juxtapose and interrelate different materialities, involving notions associated with both aspects of modernity and tradition.

With this in mind, we want to point out that the profound changes introduced by the modernization of agriculture, despite its unifying dynamic, also caused the emergence and strengthening of adaptive strategies of this rural community. Our hypothesis is that such strategies have an impact on the entire production system - whether through vertical linkages in the supply chain or horizontal cooperation

networks - in order to empower the region with a resilient response to contexts of disturbance and crisis.

In the next section, we list four factors linked to the adaptability of family farmers in Western Santa Catarina, when facing processes of crisis: production for own consumption, pluriactivity, productive diversification and processing food using traditional methods in their properties.

Production for own consumption: resilience factor I

Whilst the tradition of producing food for the market is a fact commonly reported by researchers studying family farmers in region, production for their own consumption is neither discussed nor valued. Authors like Cazella and Burigo (2008), as well as Schneider and Niederle (2010), are amongst the few to argue about the importance of this production for food security, autonomy of rural families, to minimize rural poverty and to increase sociability and social identity of family farmers. The estimated monetary values and the social implications of production for own consumption should not be disregarded, according to them. The production of basic staples for the family's own consumption constitutes an activity of paramount importance, be it in relation to the funds saved, or for the appreciation and preservation of traditional foods and cultural habits in rural communities (social capital).

In fact, Tecchio *et al.* (2011) found that despite the high socioeconomic dynamics arising from the existence of agro-industries operating in regional, national and international markets, there were always poor rural families that throughout history were found to be outside the main agricultural supply chains in western Santa Catarina. These families' survival is directly linked to their capacity to cultivate their own crops (such as pumpkin, peanut, sweet potato, medicinal herbs, beans, vegetables, popcorn, orange, cassava and maize). They also are able to extract products such as wood (used as an energy source for cooking food and home heating during the cold months), as well as keeping animals such chicken and pork, and therefore having access to meat, eggs, lard and milk.

Another important factor is that much of these foods were and continue to be processed by farmers (as discussed later). According to Dorigon (2010), almost all food processing performed within the properties was initially done on an informal basis, due to the fact that these products were - and still are, largely - produced to be consumed by the farmers themselves. According to data from IBGE from 82,143 rural properties in the region, 29.5% declared to process some type of agricultural produce in the property.

This shows that the production for own consumption – present in the region since the beginning of colonization – has contributed to the resilience, minimizing exposure and vulnerability of families in periods of lower prices paid by the agro-industries. It also represents their social capital, knowhow, and the use of specific land resources, contributing to farmers' adaptation in crises.

Family farming pluriactivity: resilience factor II

Having lived decades through processes of substantial modernization and suffered exclusion from this, many families have turned into other activities to supplement their income. Many a times, some of the members of the households in rural areas are devoted to non-agricultural activities practiced inside or outside the property. This form of organization of family labour has been called pluriactivity³ and refers to social situations in which the individuals composing a family in a rural household devote themselves to the exercise of a wide range of economic and productive activities, not necessarily related to agriculture or farming.

In this sense, pluriactivity has been an alternative found by farmers looking for additional income options. This activity points to the presence of social capital, diversification of income and innovative capacity of family farmers.

This form of work organization has been widely studied in western Santa Catarina by Wilkinson (1996), Ferro (2006) and Bianchi and Orłowski (2012), who argue that the growth of this social reproduction strategy have contributed, in many cases, to the permanence of family farmers in rural areas. Ferro (2006), in a study developed with farmers in the municipality of Concordia (SC), proved that pluriactivity has indeed contributed to the permanence of family farmers in agriculture and in rural areas. Bianchi and Orłowski (2012), in their research with family farmers in Chapecó (SC) observed that of the 50 families interviewed, the vast majority, representing 70% (35 families), were dedicated to other activities aiming at expanding their income. Pluriactivity an important economic alternative that not only contributed to improve farmers' quality of life but also helped in maintaining them in the countryside. These

3• According to Schneider and Niederle (2010), the pluriactivity is a phenomenon through which members of family farmers living in rural areas opt for different activities, or more accurately, choose to undertake non-agricultural activities, staying in the countryside and maintaining a productive connection with agriculture and life in rural space.

studies corroborates with what Wanderley (2003) proposes in terms of pluriactivity in rural areas. For her, it is "a family strategy, with the purpose of diversifying activities outside the establishment and ensuring reproduction and permanence as a central reference and convergence point for all family members". For Schneider and Niederle (2010), there is no surprise to the fact that pluriactivity is important for the western region of Santa Catarina. This phenomenon can be more prominent among family farmers in regions where this social form has a history of occupation of space and territory. So much that, the data from the 2006 census show that 18.3% of the family farmers from this region are pluriactive.

Kasimis and Papadopoulos (2013) also discussed the contribution of pluriactivity to the resilience of rural areas in Greece. They showed that pluriactivity represented a form of strategic adaptation of farmers thus contributing to increased resilience in the Greek countryside.

From the point of view of the regional economy, we can deduce that the works hitherto developed give strong indications that the pluriactivity constitutes an important factor for the expression of resilience, since it is one of the main strategies used by farmers to adapt to changes caused by successive regional crises.

This resilience supports the regional economy in two ways: first, the increased capacity of adjustment by family farmers to crisis of supply chains, which invariably result in the reduction of prices of raw materials paid by regional cooperatives and agro-industries, and greater indebtedness of the sector. To a lesser extent, resilience is expressed through the "income effect" of farming families on the local/regional consumption levels and, consequently, the maintenance of other activities, even in adverse times for the agro-industrial sector.

Productive diversification: resilience factor III

Productive diversification has marked the development trajectory of the western region of Santa Catarina in the last decade. The increase in milk production and conversion to agro-ecological/organic systems are the most concrete examples of this process.

The great emphasis on specialization is recurrent in the works that discuss development of the western region of Santa Catarina. Many a times, these studies ignore the fact that diversification remained present even during periods of increased pressure for specialization (during the 1980s and 1990s). One example is milk production, which is the

most representative activity of the resumption of current diversity of investment in agriculture in the region and as such, it is a strong social capital.

The absence of dairy farming in homesteads is something very rare. Mello and Schmidt (2003) state that it is so amalgamated with other activities that are few the farmers in the region who do not have at least a paddock with a cow. For the authors, the dairy business on a scale of up to ten cows has the potential to become established in nearly all the properties in the region. Milk was present in farms in western Santa Catarina since the beginning of colonization, although its use was mainly for consumption *in natura* by the family, or as raw material for making small quantities of cheese, butter and cream, which were also sometimes commercialised (Mello, 1998).

With the pig farming crisis and significant abandonment of activity from the 1980s, milk production gains strength and becomes an important economic activity for family farmers. So much that this region became the main milk producer in the state of Santa Catarina and one of the most important in Brazil. According to Lins and Coletti (2010), between the years 1990 and 2007 milk production in Western Santa Catarina grew at an average annual rate of 9.2%, much higher than the Brazilian average, which was 3.3%, while the growth in other Santa Catarina regions did not exceed 1.8%. This made the participation of the Western Santa Catarina in Brazil's production to jump from 1.9% in 1990 to 5.2% in 2007, and participation in state production from 42.2% to 72.3% over the same period. Data from the 2006 census show that there are more than 47 thousand milk producers in the region and 64.9% of the family farmers are milk producers. This shows the social and economic importance of this activity for the rural population of this region.

Another relevant factor is that 89% of the milk produced in the region comes from the family farms and 57% of the establishments have up to 20 heads of cattle (Konrad, 2012). Konrad (2012) also points out in his work that the region has the main dairy herd, with 68% of the state herd, which represents an average yield of 2,580 litres/cow/year, higher than the productivity of Santa Catarina and Brazil, with 2.40 and 1,590 litres/cow/year respectively.

Therefore, the dairy industry is the driving force of the diversification of large properties, since it allows a better use of labour and is an alternative to the succession of crops with annual cultivation or use of steep areas (Mello and Schmidt, 2003). Moreover, according to Schneider and Niederle (2010), milk has a smaller dependence on inputs and ensures greater autonomy of land, since milk has a strategic role in food security. All these factors allow the farmer to be better prepared to respond to external shocks and consequently make them more resilient.

Even so, the milk production might not be the best example to show just how flexible the productive structure of family farming is this region. Flexibility itself is the source of resilience, as defined by Hudson (2009). The migration from one production chain to another denotes a process of social learning, which on its turn, allows farmers to feel less vulnerable and at less risk during periods of crisis. Therefore, family farming's flexible organisation, characterised by innovation in management systems and agility to change to new types of activities has contributed to regional resilience.

The western region of Santa Catarina has a growing number of farmers who are producing food based on agro ecological principles (Badalotti, 2003) which are opposed to conventional production systems. The conversion to agro-ecological/organic production makes farmers less dependent on established agricultural markets and external resources, allowing them to enter new emerging and rapidly expanding markets. Contrary to the specialization induced by the integration process, agro ecological systems promote diversification of production. This productive flexibility allows them to respond to cyclical variations in commodity markets that affect the economic health of the agroindustry segments. This is an idea supported by King (2008), who emphasizes that alternative production systems are an adaptive strategy of family farmers and their rural communities.

Marques and Mello (2009) have highlighted the initiatives that support these adaptation strategies, such as the Microbacias Project⁴, coordinated by EPAGRI (Agricultural Research and Rural Extension Company of Santa Catarina) which has agroecology as one of its main guidelines. APACO (Association of Small Farmers in western Santa Catarina), FETRAF (Federation of Workers in Family Farming), Progressive sectors of the Catholic and Lutheran Church, MST (Movement of Landless Rural Workers) and other NGOs working in rural areas have also designed and implemented rural development projects in the region and allowed greater connectivity between the farmers and their organizations.

Although agroecological production in western Santa Catarina does not yet rival in numbers with the conventional system of production, it presents another very significant aspect to the resilience of the region, mainly because the production is aimed at the local markets. Marques and Mello (2009) emphasize that agro ecological and organic produce like vegetables, fruits, poultry, eggs and dairy get into the market usually through a direct relationship between farmers and consumers, in either street

4• The Microbacias 2 was a Project aimed at the "Recovery, Conservation and Management of Natural Resources in small watersheds in the State of Santa Catarina". Apart from the dissemination practices of conservation of natural resources, it aimed at promoting sustainable rural development and participation of farmers in decision-making circuits (Marques and Mello, 2009).

markets or door-to-door selling. It constitutes, therefore, what is called proximity circuits, which are known for being founded upon a relationship of trust between consumers and producers. The number of agroecological/ organic farmers who have built marketing opportunities in local supermarket chains and even to more distant markets is growing as well.

In terms of livestock, milk production also stands out in its attempt to move away from conventional systems of production. Badalotti (2003) draws attention to the fact that regional dairy production is concentrated on the family farm, and based primarily on pasture. Both Badalotti (2003) and Marques and Mello (2009) talk about the relationship between ecological milk production and its processing in cottage industry units, a topic that will be addressed later on this work.

Finally, even if the number of family farmers using non-conventional systems in western Santa Catarina is inexpressive, their current growth confirms that family farming has great productive flexibility, an attribute that gives the region a greater resilience to face crisis processes occurring in major markets and supply chains.

Artisanal processing methods: resilience factor IV

Cottage industry in Western Santa Catarina, according Dorigon (2010), draws from a traditional knowhow held by farmers who colonized this region. These farmers brought with them the skill and habit of artisanal food processing for the production of salami, cheeses, jams and jellies, canned vegetables, pasta and crackers, brown sugar, juices and wine, to name a few. These products were mainly for the consumption within the household and the process of making part of the farmer's daily routine. Since the beginning of colonization, there was also an informal market for these processed products. This market (usually) is the informal basis for the emergence of a vigorous movement of building networks of artisan processing units (Dorigon, 2010). As such, they also represents the social capital of these farmers.

From the 1990s, many of these cottage industries began to thrive in the region, varying in terms of structure, social spaces, types of products and markets (Mior, 2007). They processed pork and to a lesser extent, poultry and milk, as well as those products derived from sugar cane (molasses, brown sugar, rum), fruits (jams and jellies) and vegetables. According to Mior (2003), the cottage industries of Western Santa Catarina are "a form of organization where the rural family produces, processes and/or transforms part of its farm production and/or livestock aimed mainly at the production of exchange value that takes place during selling". These cottage industries are located in

rural areas, do not use neither the machines nor the equipment used by traditional large agro industries, produce most of the raw material and / or source it from neighbours, have their own artisanal processes and use family labour (Mior, 2003).

For Mior (2007), the farmer became a small rural entrepreneur who, individually and/or organized in associations, small cooperatives etc., is tightly integrated with the local/regional territory. A similar situation is discussed by Glover (2012) and Schneider and Niederle (2010). For these researchers the relationship between agricultural activities and small businesses in rural areas are important sources of employment and are often the only industries viable in these areas. Moreover, this relationship ends up enhancing resilience in rural communities. They also represent the ability of this social group to innovate.

The importance of cottage industries in Western Santa Catarina is best expressed in numbers as shown in table 3.

Table 3.
Number of cottage industries by product type in Western Santa Catarina⁵

Product	Western Santa Catarina
Fruits and by-products	201
Sugar Cane and by-products	208
Pastry / Bakery	146
Milk and milk products	146
Cassava and by-products	50
Vegetables and by-products	69
Honey and by-products	43
Pork and by-products	60
Eggs	63
Grains and derivatives	31
Poultry and poultry products	27
Cattle and derivatives	18
Others(1)	85
Total	1,147

¹ Fish and derivatives, wood, palm trees, sheep and by-products, brooms, erva-mate and medicinal plants.

Source: Adapted from Dorigon *et al.* (2010).

- 5• For the purpose of the survey, cottage industries were considered those that: (a) systematically produce for selling; (b) generate (or might generate) significant income for the entrepreneurs; (c) have appropriate infrastructure; (d) are legal or eligible to be legalized; (e) are not selling only the surplus.

Table 3 shows that in addition to the large number of cottage industries they are also very diverse in terms of the number of products. This indicates, as observed by Mior (2003) and Dorigon (2010), the importance of tradition and expertise in processing different products that are present in family farming. Moreover, these cottage industries can also be seen as part of a process of construction of horizontal networks of rural development, as discussed by Mior (2003).

However, both in the work by Dorigon, as well as by Mior, it is clear that cottage industries appear as adaptive responses to the crisis processes experienced in the region. Small scale food processing is a strategy to add value to products that have a different quality in relation to those produced by major industries and cooperatives. They draw on the use of artisanal expertise and regional culture. Its expansion opens up the possibility of greater autonomy for local markets to face the cycles and crises in the agroindustrial sector, thus increasing regional resilience.

Conclusions

In this article, we have shown how the structural changes observed over the past decades in the rural area in the region of Santa Catarina disrupted the reproductive strategies of family farmers.

Family farming has played an important part in the history of this region and has been fundamental for the organisation of agrarian systems and the evolution of the productive structures. The fact that family farmers are still present in the life of the region today, making a significant contribution for the regional economy indicates that they have a great capacity to go through economic cycles.

However, despite this vigorous economic performance, it is clear that rural communities are constantly seeking adaptive strategies in order to face difficult scenarios. Many resilience studies confirm the fact that a community might help in building a resilient territory, allowing it to better adapt to change, less vulnerable to external turbulence and shocks, better able to absorb perturbations and to persist, and even be able to benefit from crisis and avoid collapsing altogether.

The study has identified four main resilience factors: production for own consumption, pluriactivity, productive diversification and artisanal processing.

The production for own consumption is linked to the social capital of this group, being present from the beginning of the colonization of the region. This strategy contributes substantially to household income and ensures a diverse and healthy diet for farmers, minimizing exposure and vulnerability in times of crisis. Furthermore, it is important to emphasize their culture and tradition form the basis a thriving cottage industry in the region.

Pluriactivity has been a solution found by the farmers seeking additional income options. It is indicative of the presence of social capital, of the ability to have diverse sources of income and the capacity farmers to innovative. As such, it has appeared as an important expression of resilience, since it enhances the ability of family farmers and consequently the territory to assimilate external crises.

Productive diversification is a form of adaptation represented mainly by the increase of dairy farming and by the conversion to agroecological/organic systems. These activities are the most significant examples of the flexibility of the productive structure of family farming in Western Santa Catarina. As such, show processes of innovation and social learning in rural areas, which allow the reduction of vulnerability and risk in the face of the unknown and the unexpected.

As for the cottage industries, they also refer to the ability to innovate and make use of local social capital, artisanal knowhow and regional culture. It represents the adoption of strategies to add value to products from family farms, which produce on a small scale and with a different quality in relation to major industries and cooperatives. They provide greater autonomy to local markets against the cycles and crises, enhancing regional resilience.

Therefore, these four factors reveal that farmers are able to combine integration to markets connected to agroindustries, with new market relations, developing alternative ways through which they can use their own resources more effectively, especially family labour. All these four factors demonstrate that the farmers of the Western part of the state of Santa Catarina have given resilient responses in contexts of crisis and disruption. Against all odds, family farmers as key figures of the economic success and dynamism of Western Santa Catarina.

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