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Sustainability transformation of agri-food systems: spaces of governance and coordination for territorial scaling. An empirical analysis in Italy.

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Abstract

Faced with increasing risks from climate change, food systems will need to transition away from dominant industrial paradigms and move towards a more sustainable way of producing, distributing, and consuming food. One solution or one side alone though might not have the desired systemic change or might not capture the full complexity of food systems. To go beyond two known criticisms of local food sustainable initiatives, i.e., to be rather small and to be developed outside policy frameworks and/or in stark opposition to current food systems, in this thesis I argue to look at governance spaces of transformation at local level where community members, professionals, and governments get together to share knowledge, deliberate, and collectively devise place-based strategies to address complex food systems issues. The thesis is divided into three chapters. To completely understand spaces of transformation, the first chapter provides a conceptual framework of analysis combining ideas from sustainability transitions, environmental governance and sustainable food communities' approaches. With the first chapter laying out the theoretical framework, chapter 2 and 3 will rely on the empirical analysis of data gathered through interviews and surveys. The conceptualization of territorial spaces of transformation and the analysis of whether biodistricts can be considered such spaces of transformation for food systems, will be laid out in chapter 2. Chapter 3 will consider two additional research questions, namely how territorial characteristics influence the emergence of a biodistrict, and what role the biodistricts have in territorial transformations towards agroecology. The aim of the thesis is to generate solid and harmonized evidence on the impact of biodistricts on key sustainability characteristics, such as a biodiverse environment, inclusive societal and cultural values, sustainable economic development, sound governance systems and organic, regenerative agricultural practices. The results allow to develop a blueprint for biodistricts as meso-spaces, showing how the presence of actors, the objectives, activities, and governance structure should evolve according to the maturity phases. Moreover, the application of the CAET-TAPE assessment shows that the biodistricts are performing solidly on agroecological transitions.

Keywords: sustainability transitions, food systems, grassroots innovations, governance.

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Introduction

A recent report from the Intergovernmental Panel on Climate Change (IPCC) highlights the current climate change risks that the world is facing, and it makes clear society and policy are acting too slowly to changes which seem to be increasing rapidly (IPCC, 2019). The same report (*ibid.*) shows how agri-food systems have one of the highest impacts on pollution and green-house emissions at world level.

In order to sustainably meet the increasing demand for food, the agri-food systems will need to transition away from the dominant industrial agriculture paradigm (El Bilali, 2018) to one of sustainable agriculture that ‘conserves land, water, and plant and animal genetic resources, and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable’ (FAO, 2012).

The literature of sustainability in food systems usually takes two general approaches to the topic. One sees a technological solution to sustainability: this approach is referred to as agro-industrial paradigm, and it is based on agricultural modernization, industrialization and standardisation of food production, and the globalization of food markets (Renting and Wiskerke, 2010). In this approach, technological processes are favoured over social innovation.

On the opposite end, there is the integrated territorial paradigm (Kristensen et al. 2016; Lamine et al., 2012), which sees the solution in reinforcing the capacity of agri-food systems in the valorisation of specific territorial embeddedness and social relations. This approach takes a holistic view towards food systems, acknowledging their interconnectedness with other local characteristics, such as nature and landscape conservation, tourism, care, and education (Renting et al., 2008; Van der Ploeg and Marsden, 2008).

The territorial approach is in stark contrast with the standardized and place-less agro-industrial approach, but it is facing two criticisms. First, as Lamine et al. (2012) show, territorial short-food chains (e.g., diverse food networks and grassroot innovations), though usually characterized by higher sustainability performances, sometimes fail to play a leading role for systemic transitions: these initiatives in fact remain relatively small and localized, and dissemination models like up-scaling or out-scaling (i.e., multiplication) at local level are not sufficiently defined.

Secondly, existing local sustainability initiatives usually have developed outside policy frameworks or in opposition to current agri-food systems (Lamine et al., 2012), and governance tools and methods might be useful to bridge this void.

In the past, market and public regulation have always been considered as the most important governance tools, but civil society has usually been left out of the picture (Lamine, 2015). The involvement and role of civil society has sometimes been reduced to atomistic passive purchasers and consumers of food products (Renting et al., 2012). In similar fashion, farmers were largely considered individualized recipients of state regulations and price-takers in the markets.

This model has been put under great pressure in the last two decades: in fact, the emergence of small concentrated market parties, market liberalization and privatization, the emergence of market

empires beyond control of the states, and the increasing domination of private corporate interests has pushed several actors within the food systems to look for diverse modes of production and distribution. Now, the potential roles and responsibilities of the governments are changing, and new opportunities are emerging. At local and regional levels, for instance, we can find new governance tools for supporting localized sustainable food systems and multifunctional forms of agriculture within rural development measures.

In this context, sustainability transitions appear to be a complex process that entails a large set of actors at different geographical scales. Scholars and practitioners are starting to acknowledge the fact that one solution or one side alone cannot have systemic change or cannot capture the full complexity of the experiences in the agri-food systems. Policies, civic engagement, grassroots' activism, and firms' transformations are all equally important and need to be brought forward in a framework of intelligent planning. This vision, as highlighted by Lamine et al. (2012), also allows to adopt an integrated approach, which focuses on relations developing among all relevant actors in the new food environment.

This new approach, moreover, can be considered multi-scale, in the sense that, while acknowledging that some important legal frameworks and policy decisions are taken at national level, it also acknowledges the importance of lower systems: lower administrative and local levels are fundamental for policymaking and, especially, for implementation and impactful action.

For sustainability transitions to happen, it is clear that new forms of territorial arrangements are then necessary without necessarily being considered in stark contrast to the global standardised food players. Some authors have highlighted how sustainable food communities (Blay-Palmer and Koc, 2010) enhance the valorisation and creation of social capital, and, together with participatory and empowering processes, they re-create the necessary spaces for sustainability transitions (Pugliese et al., 2015). A sustainable food community approach has also been taken by FAO: it has been developed with the key aim of fostering the development of resilient and sustainable food systems within urban centres, peri-urban and rural areas surrounding cities, by strengthening rural-urban linkages (Dubbeling et al., 2017).

In order to go beyond the two mentioned criticisms of local food sustainable initiatives (to be rather small and developed outside policy frameworks or in opposition to current agri-food systems) in this thesis I explore the concept of new spaces of transformation at local level. The concept of space, as I will show in the theoretical framework section (chapter 1), has been analysed in relation to the concept of sustainability transformations by many authors. What has been missing in the literature so far, though, has been a concrete definition and characterization of such spaces at local level where sustainable transformations can be favoured and enabled. For this reason, I will try to address a key research gap: the conceptualization of territorial spaces of sustainable transformation, with an empirical analysis of biodistricts in Italy.

In these spaces, community members, professionals, and government(s) can potentially get together to share knowledge, deliberate, and collectively devise place-based strategies to address complex food systems issues (Bassarab et al., 2019).

The guiding question of this thesis is: what fosters and hinders successful transformations of food systems towards sustainability?

Following along the guiding question, the thesis will disentangle this complex issue by looking at several topics and by trying to answer the following specific questions:

1. How can territorial spaces of transformation be conceptualized?
2. To what extent can biodistricts become territorial spaces of transformation for food systems?
3. How do biodistricts evolve?
 - a. What is the role of territories in the emergence of biodistricts?
 - b. What is the observed impact of biodistricts on the transition of territories towards agroecology?

This doctoral dissertation aims at reaching three objectives:

1. provide further clarification to the concept of spaces of transformation for sustainability and biodistricts;
2. provide insights on dynamics, actors and impact of biodistricts as spaces at territorial level for the sustainable transformation of food systems;
3. provide the instruments of dissemination of spaces of transformation for the inclusion of grassroots and institutional actors, taking inspiration from, but not stopping at, biodistricts.

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1. Chapter 1 – Critical literature review and the emergence of the concept of spaces of transformation.

1.1. Introduction

In this conceptual and explorative chapter, I will perform a critical literature review on sustainability transitions of food systems, and I will lay a solid basis underlying the research unravelled throughout the thesis. The aim of this chapter is to provide a conceptual framework of analysis, locating the thesis topic within the relevant literature, and to make clear what is the current research gap that I am trying to address. Overall, by disentangling the concept of governance spaces of sustainable transformation, I aim at analysing and bringing clarity to the concept of solution spaces at local level for the sustainable transformation of food systems.

Studying the sustainability transformations of food systems is not an easy task. A simplified perspective of sustainability in some cases has been to consider only the environmental performances of the farming activities (e.g. polluting emissions or the use of natural resources) (Pacini et al., 2003), but there have been also attempts to improve the impact measures by looking at the full life cycle of the food, at first by using a Life Cycle Assessment (Van Der Werf and Petit, 2002) and later by taking the perspective of a complex commodity chain, the so called ‘from farm to fork’ approach (Barbera et al., 2014), which gives importance to activities going over production and distribution and bringing consumption activities into the picture.

What needs to be stressed here, though, is that at times the sustainable transformation of food systems produces unwanted consequences, with retailers appropriating consumers’ demands only selectively (Friedmann, 2005) and building market solutions that respond only to their economic interests (Marsden 2000), rather than on broader social and environmental sustainability needs. This process is known as conventionalisation in the organic sector, and it is still debated whether such dynamics contribute to a transformation of the agri-food system towards more sustainability, or they reinforce lock-in effects (Darnhofer et al., 2010).

It follows that local and sustainable food could therefore be managed as a niche market, with their key motivations to display such products being just strategic (e.g., higher profitability) rather than ethical and sustainable (Bui et al., 2019).

For this reason, several authors (Allen, 1993; Erickson, 2008; Blay-Palmer and Koc, 2010) highlight how the process towards sustainability can and must also become a powerful tool to reach a democratic and just food system, making sure that practices along the supply and value chain are avoiding exploitation of people and natural resources, while striving to enhance emancipation of and opportunities for society as a whole in an equal way.

Measurable sustainability characteristics for the agri-food products and services, in the past, have been summarized in formal governance and guarantee models governed by the market and the public actors (either through product labels or policies), but in the absence of reliable information and lack of trust in globalized chains, local food purchasing has also become a strategy for several consumers to keep control of the consequences of their purchases: ‘local’ has become associated with organic, seasonal, nutritious and natural (Brunori and Galli, 2016). It is clear then that local

has come out as an alternative model to global food supply, by having small, diverse and sustainable characteristics as opposed to big, standardized and destructive natural resources.

Lamine (2015) shows how sustainability has been linked to re-localization, especially when related to the sustainability of alternative food networks: more local, in fact, would mean less physical distance with subsequent less environmental impact, fewer intermediaries and more added value with better conditions for farmers, and finally less social distance between producers and consumers, with less social links and more sustainability. At the same time, there is the need to be aware of not falling into what some authors are calling the 'local trap'. The view that local equals sustainable, without further questioning what lies behind the local, has been challenged by several scholars (Brunori and Galli, 2016; Born and Purcell, 2006): in fact, the growth of the local food, together with an increasing concern for sustainability and suspicion of industrial food, has stimulated big players to take the issue of sustainability more serious, but also, on the other side, to appropriate the features originally introduced by local actors. This has brought local and global chains to converge, therefore also posing a threat to small niche players and local chains.

The spatial sense of 'shortness' has been an object of study by many scholars, (Blay-Palmer and Koc, 2010; Marsden and Sonnino, 2012; Lang et al., 2013) all highlighting how, although pressures are at global level, perspectives in the food systems need to be implemented looking at localities and regions. Therefore, the understanding is growing that place-based solutions would need to be considered to identify and respect local needs, and mobilize the appropriate resources, while on the other hand there is also the need to look at meta-scale structures for facilitating the necessary change (Blay-Palmer and Koc, 2016).

While one of the principal reasons for shortening and localising food chains would be to reduce the distance food travels between production and consumption, therefore increasing the environmental benefits, also economic and social reasons need to be taken into consideration (Seyfang, 2006). As globalized and industrial food systems usually separate economic transactions from social and environmental contexts, the new economy of food should favour socially embedded economies of place. A space-based sustainable food could make sure that embeddedness of economic activities within social rules and norms highlights the aspects of the local context (Bloom and Hinrichs, 2011): social relationships might then be able to modify and mitigate the rules of a merely profit-oriented economic logic, which can at times disadvantage smaller farmers in the market, and they might create new economic spaces for sustainability transitions to happen.

Food can be re-socialized and re-spatialized, and the consumer can make additional value judgements about what they buy, drawing from their knowledge, experience, and perceived imagery (Renting et al., 2003).

It is therefore in this sustainability context that local food spaces of transformation play important and relevant roles. Place-based solutions are indeed strictly related to sustainability activities of food production, distribution, and consumption.

For this reason, it is extremely important to answer the first specific research question of this thesis: "how can territorial spaces of transformation be conceptualized?". In fact, understanding

how space and local characteristics influence transformations of food systems towards sustainability could be the key to disseminate instruments of change and scale up transformation from local to extended actors and spaces.

In the agri-food sustainability transitions literature authors highlight how it is extremely difficult to take grassroots innovations and scale them up. Although grassroots innovations have enormous impacts for the people who take part in them, sometimes they struggle to change the system, also called ‘regime’ within certain economic frameworks. At the same time, resistance from the regime to change is making sustainability transitions hard to happen.

Along with this, it is important to highlight that Ostrom (1990) already noticed the importance of small governance groups as units of functional organization. They are in fact best qualified to regulate themselves and adapt to their local environments. Small groups in fact require the core design principles listed above like any other group, but the core design principles are often more easily realized in small groups than in larger groups. From an evolutionary perspective Wilson (2015) states that large-scale human society needs to be multi-cellular. In fact, the biologist stresses the fact that the more society participates in small groups that are appropriately structured, the more effective and satisfied will be: this will allow the groups to contribute better to the welfare of society at larger scales.

In general, the governance of sustainability transitions in agri-food systems still need to be thoroughly analysed and there needs to be solutions tackling what is necessary to bridge the gap between grassroots innovations and systemic change. Also, it seems important to understand how organic production and ecological approaches of producers can be shared at local level.

Some innovations for sustainability at territorial level, implemented through different governance mechanisms and coordination settings, are seeking to change the context: for example, biodistricts, Food Policy Councils, City-Region Food System approaches, are all happening at local level with the objective to transform agri-food systems, for better food security and access, and higher economic, environmental and social sustainability.

Therefore, the aim of this chapter will be to create the theoretical basis that will guide the analysis of data and materials collected throughout the field research. This chapter will first try to create some clarity on the concept of sustainability transitions and then will analyse how sustainability transitions are influenced by the concept of place (section 1.2). Subsequently, section 1.3.1 will explore how governance and coordination at local level can provide useful instruments for transforming food systems towards sustainability.

Section 1.3.2 will bridge the concepts by introducing sustainable food communities as an approach to incentivize territorial social responsibility. Being biodistricts associations with strong rooting in the territories where their activities take place, and given their ease in building communitarian local relations, this literature will provide strong tools of analysis for understanding whether biodistricts can be considered as spaces of transformation and for exploring if and how territorial characteristics influence the emergence of biodistricts.

Section 1.3.3 and 1.3.4 will provide additional concepts and tools of analysis for allowing an evaluation of the role of biodistricts in territorial transformations towards agroecology.

With this first chapter laying out the theoretical framework, chapter 2 and 3 will rely on the empirical analysis of data gathered through interviews and surveys (see section 1.5 for specific details on how the materials have been collected). The conceptualization of territorial spaces of transformation and the analysis of whether biodistricts can be considered such spaces of transformation for food systems, will be laid out in chapter 2. Chapter 3 will consider two additional research questions, namely how territorial characteristics influence the emergence of a biodistrict, and what role the biodistricts have in territorial transformations towards agroecology.

By taking a systems view, this chapter will also try to highlight what is currently the state of the art of the literature regarding sustainability transitions of food systems in general.

1.2. Sustainability transitions in agri-food systems

The term ‘transition’ has become increasingly important in the last decades, although it can be interpreted differently in practice and in academia. Rotmans et al. (2001) define transitions as ‘fundamental social, technological, institutional and economic change from one societal regime or dynamic equilibrium to another’. Transitions to more sustainable agri-food systems are considered to be essential and they form the basis for grassroots initiatives, theoretical debates, new governance initiatives and policies. Especially important is also the embeddedness of food production and purchase into social, cultural and political dimensions (Rossi and Brunori, 2010).

The current challenges faced by societies and their struggle to move to more sustainable development trajectories has brought a growing interest in the governance of socio-technical transitions (Grin et al., 2010). Transition theories (Geels, 2004) talk of regimes as socio-technical systems governed by rules and norms, with innovations contributing to the stability of the existing systems, and they talk about niches, which are socio-technical systems where experiments happen: these experiments are inherently different than current actions happening in the regimes. When contextual conditions (called landscape) change, the innovations initiated by the niches should bring a change to the dominant socio-technical system, either through integration of the innovation or through replacement.

Markard et al. (2012) have defined sustainability transitions as long-term transformations where socio-technical systems move to more sustainable modes of consumption and production.

In sustainability transitions, private actors in existing regimes have limited incentives to address transitions (Geels et al., 2011), while public authorities and civil society are usually more prone to tackle these topics, though with different interests and outcomes (Elzen et al., 2011). The process of resistance and exclusion of alternative solutions by the dominant (usually) unsustainable systems is called ‘lock-in’ (Sanne, 2002). This process of lock-in, or path-dependency, happens when current actors in a regime or system resist the change towards sustainability due to previous investments in certain technologies and production modes, and due to the uncertainty that the rest of the system will follow with the change (see for example suppliers, consumers, etc.). For the sustainability niches to break through the regime, first they need to be created and fostered:

Strategic Niche Management theory (SNM) (Rip and Kemp, 1998) tries to create a model of analysis for radically new innovations and how they are born and used to trigger wider systemic transitions. According to Kemp et al. (1998), three elements are fundamental for a niche to emerge and grow: shared visions and expectations; wide network of stakeholders supporting the niche's emergence; and learning, by which current regime assumptions and constraints are questioned.

In the agri-food systems context, most niche and regime analyses have been studied through the Sustainability Transitions lenses (Markard et al., 2012) and they have been framed through the Multi-Level Perspective (MLP) developed by Geels (2002, 2005, 2011). The MLP is considered a heuristic framework, which is helpful to analyse transitions defined as processes of deep regime reconfigurations: these reconfigurations should bring a shift from one socio-technical system to another.

In general, the success of the niche is related to its compatibility with the mainstream regime, but this also poses a risk of blunting the niche, as I will discuss in later sections. Goodman et al. (2012) highlight how agri-food producers, consumers and activists often create institutional innovations which oppose the industrial logic of incumbent food regimes. In the agri-food systems indeed the regimes are defined mainly as industrial farming and integrated food supply chains, while with niches the following can be identified: agroecology, organic agriculture, permaculture, urban agriculture, conservation agriculture, integrated farming, care farming, alternative food networks (El Bilali, 2019). As cleverly stated by Holtz et al. (2008), the boundaries between alternative and conventional, and between niche and regime, are not always clearly defined but they are a matter of social constructs, framing and deliberation.

Hermans et al. (2017) highlight how MLP has been used to explain how local knowledge and innovations spread from the micro levels of small groups of innovators to the higher macro levels in society: the theory in fact makes a distinction between three more-or-less hierarchical levels of niches, regimes, and socio-technical landscapes that form the micro, meso, and macro levels of bottom-up socio-technological development processes. Also, Geels and Schot (2007) have analysed historical socio-technical system transformations, revealing that niches have fostered wide-spread system change when regimes (dominant systems) had been under tensions from landscape dynamics (e.g., changes in lifestyles, financial crisis, climate change, etc.).

Seyfang And Longhurst (2013) suggest three ways for niches to influence the wider systems in practice: enabling a replication of projects and many small initiatives similar to the niche experiment; enabling an increasing participation of people; facilitating the translation of niche ideas into the setting of the dominant system.

Along with the missing pieces of the MLP theory (mentioned above), SNM studies already concluded that niches alone are unable and unlikely to transform dominant systems (Smith, 2007): in fact, transformation is highly dependent on contingencies and processes which are beyond the unilateral control of niche actors. When idealism, which is a key factor behind the launch and development of niche activities, is encountering the reality of institutions and the regime, the embeddedness of the sustainable practices can become a challenge, and sometimes not even wanted by the niche itself.

Smith (2007) identifies how policies should help niches growing and soften the tensions between niches and regimes, and he also highlights the role of intermediaries in general, which should create connections between niches and regimes: according to the British scholar intermediaries could be a part of culture, society, knowledge, labour, market, planning and welfare, and they could have various roles, among which, for example, initiating projects or sharing information among various groups. For the replication of niche projects across different geographies, intermediaries are necessary (Seyfang and Longhurst, 2016), but they are not sufficient, being unable to replicate confidence, tacit knowledge and trust. In general, though, several scholars (e.g. Hossain, 2016; Hargreaves et al., 2013) tell us that the role of intermediaries in replicating niche innovations across different settings and geographies should be further analysed. I will keep this in mind when closing on our conclusions at the end of this chapter.

Seyfang and Haxeltine (2012) have cleverly pointed out that at times niche actors (like community level actors and grassroots innovators) are unwilling to create a wider change in the regime, having their hopes of active change actually low, rather expecting a collapse of society or the systems, and therefore being able to fill the vacuum: this stance of the niche actors (e.g., Transition Towns) has been open to criticism (Hopkins, 2008; North, 2011) but the key takeaway is that engagement, energy and collective action of communities, all together (and all characteristics sometimes given for granted by policy-makers or intermediaries willing to scale sustainable niches), are necessary for the change to be catalysed and have an impact (Seyfang and Haxeltine, 2012).

Elzen et al. (2012) add to this, saying that, for a niche innovation to be anchored and spread in the regime, three factors are fundamental: the expansion of the network of actors supporting the novelty; the possibility to translate the rule of the niche into the formal and informal dominant system rules; and the possibility to specify the technical (or social) attributes of the novelty so that it can be adopted in the regime (Bui et al., 2016).

Sometimes what can hinder the transformation and transition towards sustainability is the presence of a path dependency: developed within evolutionary economics (Dosi, 1982), this theory says that a certain trajectory within a system could become even more dominant due to the reaffirming feedback of its implementation, therefore ignoring the existence of alternative solutions. Possas et al. (1996) have shown this theory happening in the agri-food systems, with the convergence towards and the reinforcement of the productivist unsustainable industrial regime. Smith (2005) adds to this, by showing that technical artefacts embedded in existing infrastructures, current institutions and government policies, prevailing social attitudes and habits and past experiences all reaffirm path dependency of the current agri-food regime.

Following on the topic of complex sustainability transitions, Avelino and Kunze (2009) analyse sustainable community movements across Europe and stress the importance of multifunctional interaction of innovations, social dimension in community changes, understanding the dynamics of self-governed citizen initiatives (opposed to centralized governance) and the role of trans-national networks.

The authors (*ibid.*) interestingly point out how sustainability transitions need a change also in personal relations, beliefs and lifestyles, and these cannot be mediated by markets or states. This

characteristic is strengthened by the need of empowerment of niche actors: Avelino and Kunze (2009) define empowered actors as the ones having access to resources, to strategies and skills, to willingness and motivation to exercise the power for a specific goal.

Part of transition management goal is to empower actors by providing niches with the framework to exercise transformative power. Niches therefore could enable citizens and actors to own and mobilize technological, social and natural resources to transform sustainable ideas and visions from ideal to practical. Niches, finally, need to use the power of regimes to change things in order to extend the transformative and innovative power for a broader reach. For sure they will encounter resistance from the regime, but once successful the change will be more long-term when actors have been empowered.

For this reason, Coenen et al. (2012) have argued that focusing on territorial embeddedness might help in understanding the institutional characteristics of the different territories. Also, the scholars (*ibid.*) point out that there is a need to look at territoriality in the scales of transitions and propose to conceptualize transitions as interdependent processes between territorialized, local and trans-local networks within the context of multi-scalar, institutional structures. Coenen et al. (2012) in fact, highlight how particular places in the evolution of transitions might offer an interesting potential and suggest scholars to look at spaces where networks of actors can simultaneously develop their local resources and access and influence resources at different spatial scales.

Therefore, a potentially successful solution space is getting delineated: a space which is neither at grassroots level (niche), neither at institutional level, but that is in-between the two levels, at ‘meso’ level. This space might provide a hybrid space of coordination and dialogue between the two levels within a certain territory for transitions to happen.

The next sections will explore the concepts of sustainability in agri-food systems and the concept of territory and short(er) food chains: the analysis in these sections will aim at clarifying the taxonomy of sustainability transitions of local food systems and, additionally, at introducing the concept of sustainable food communities and governance spaces for transformation.

1.2.1. Sustainability and place

Sustainability in agri-food systems is defined with environmental integrity, economic viability and social equity (Blay-Palmer et al., 2016). In some cases a simplified perspective has been to consider only the environmental sustainability of the farming activities (e.g. polluting emissions or the use of natural resources), but there have been also attempts to increase the impact measures by looking at the full life cycle of the food, at first by using a Life Cycle Assessment (LCA) (Van Der Werf and Petit, 2002) and later by looking not only at single commodity but taking the perspective of a complex commodity chain, the so called ‘from farm to fork’ approach (Barbera et al., 2014), which gives importance to activities which go over consumption and distribution and bring in the picture the consumption activities.

Bui et al. (2019) highlight how in some strands of literature of food systems, two approaches to sustainability have been taken. One approach has remained favourable to the dominant agro-industrial model, by emphasizing the potential of ecological modernization and by trying to bridge

the economic and industrial growth with social and environmental sustainability, just by integrating environmental objectives in strategic plans (Spaargaren and Mol, 1992; Janicke, 2008). This approach is using a technocratic view of progress, where technological innovation is used to achieve higher efficiency in the use of resources and higher yields (precision agriculture, robotization, GMOs, etc.), but with sustainability only becoming a secondary objective or a by-product. An alternative approach has had a focus on a deeper systemic change, highlighting more strongly the rethinking and re-localization of the food systems, and by having in mind, at the same time, social, economic and environmental aspects (e.g., Renting et al, 2003; Lamine et al., 2012; etc.): in this respect, permaculture, agroecology, grassroots innovations, Alternative Food Networks, Social and Solidarity economies within agri-food systems are all relevant.

Some studies (Lamine et al., 2014; Bui et al., 2019) indicate that only by imposing certain criteria like homogeneity standards, volume and uninterrupted supply requirements on the upstream part of the food chain, corporate retailers are excluding from their sales a significant part of the foods that are produced in a more sustainable way. At the same time, pressure on prices from corporate giants contributes to further shrinking the number of small producers, while increasing the number of few larger producers (which are the ones resistant to price pressures and able to shrink their costs even more) (Konefal et al, 2005). As very well explained by Bui et al. (2019) several scholars are discussing whose responsibility should be to rebalance the power in the agri-food systems, either the social movements or the state. As I will elaborate more in-depth later in the chapter (and as I hinted briefly at the end of the last section), a good compromise could be represented by spaces of territorial governance and coordination, both for up-scaling and for out-scaling.

What needs to be stressed here, though, is that at times the systems produce unwanted consequences, with retailers appropriating consumers' demands only selectively (Friedmann, 2005) and building market solutions that respond only to their economic interests (Mardsen et al., 2000), rather than on broader social and environmental sustainability needs. This well-known process is known as conventionalisation process in the organic sector, and it is still debated whether such dynamics contribute to a transformation of the agri-food system towards more sustainability, or they reinforce lock-in effects. For corporate retailers local and sustainable food is usually managed as a niche market, with the key motivations, according to Bui et al. (2019), to display such products being just strategic (better profitability) rather than ethical and sustainable. As also highlighted by Boltanski and Chiapello (1999), cases like these illustrate clearly how capitalism most often than not feeds on its critique.

Measurable sustainability characteristics for the agri-food products and services, in the past, have been summarized in formal governance and guarantee models governed by the market and the public actors (either through product labels or policies), but in the absence of reliable information and lack of trust in globalized chains though, local food purchasing has also become a strategy for several consumers to keep control of the consequences of their purchases: 'local' has become associated with organic, seasonal, nutritious, natural, etc. (Brunori and Galli, 2016). Local has come out as an alternative model to global food supply, by having small, diverse and sustainable characteristics as opposed to big, standardized and destructive natural resources.

Also, Lamine (2015) shows how sustainability has been linked to re-localization, especially when related to the sustainability of alternative food networks: more local, in fact, would mean less physical distance with subsequent less environmental impact, fewer intermediaries and more added value with better conditions for farmers, and finally less social distance between producers and consumers, with less social links and more social sustainability. The view that local equals sustainable, without further questioning to what lies behind the local, has been challenged by several scholars (Brunori and Galli, 2016; Born and Purcell, 2006): in fact, the growth of the local food, together with an increasing concern for sustainability and suspicion of industrial food, has stimulated big players to take the issue of sustainability more seriously, but also, on the other side, to appropriate the features originally introduced by local actors. This has brought local and global chains to converge, therefore also posing a threat to small niche players and local chains.

Born and Purcell (2006) stress the fact that some actors have tended to fall into what they call the 'local trap', which means assuming that something local would be inherently sustainable. They have highlighted how, no matter the scale (local or global), the outcomes produced by a food system need to be considered together with their contexts: they indeed depend on the actors involved and the agendas implemented by the particular social relations in a given food system. What is interesting to note, then, is that while the local systems could be a mean to produce in a more sustainable way, they should not be necessarily the planned objective.

A complete localized food system could be the objective for some places, rich in biodiversity and with the proper climate and skills to grow and produce the range of products for a diverse dietary menu, but it could also be, on the opposite, a mean to diversify the food system for other places, together with a more globalized food system, in case the territory cannot support the food requirements of the population.

Following on this, Delaney and Leitner (1997) and Kelly (1997) already highlighted the fact that geographical scales are usually a product of social links and relations: any scale, according to these scholars, is indeed produced socially through social and political constructs. Therefore, localization could be a scalar strategy resulting either in, for example, social and food justice, or ecological destruction and oppression. It all depends on the which agenda is advanced as a result of the strategy (Born and Purcell, 2006).

Following with Born and Purcell (2006), analyses of scale must examine a range of scales at once and should question which are the changing interrelations among various scales. I will need to take this point into account when proposing a way forward to look at the governance tools advancing sustainability transitions of agri-food systems.

In general, there have been growing public and academic concerns towards sustainable food systems, with the denouncing of the negative impacts (e.g., environmental degradation, social injustice, outsized scales, high levels of waste, etc.) caused by the industrialization and the globalization of the food systems. Blay-Palmer et al. (2016) cleverly points to the fact that the food systems are arbitrarily defined by the person taking the view: the policymaker drafting a new food regulation or for example a researcher tackling an agri-food issue, might have differing views on where to draw the boundaries of said systems.

Here, taking the previously mentioned farm-to-fork approach might be suggested, but the solution is also to always consider that the conceptualization and the boundaries of food systems might shift according to differences in social, cultural or personal constructions: the core object under study could transform in influential context, and vice-versa. This follows also from the analysis done by Erickson (2008): to understand a food system holistically, interactions between all the parts and actors in the system need to be considered. Erickson (2008) stresses the importance in using case studies to understand processes and factors governing complex food systems, and to always consider multiple levels and scales (e.g., outside drivers and context), even though the outcome might only be perceived in one level or scale of the food system.

Erickson (2008), like Blay-Palmer et al. (2016), goes beyond food security, which is defined by the World Food Summit in 1996 as ‘physical and economic access to nutritious and safe food all the times by all people’. The researcher indeed includes social welfare together with environmental and eco-systems security within the characteristics of sustainable food systems.

Sustainability therefore can become a powerful tool to reach a democratic and just food system, making sure that practices along the supply and value chain are avoiding exploitation of people and natural resources, while striving to enhance emancipation of and opportunities for society as a whole in an equal way (Allen, 1993). Having increased concerns about hunger alleviation and malnutrition and the sustainability in general of the agri-food systems (Koc, 2009), a re-evaluation of systems is therefore necessary. As highlighted by several scholars, as a society there is a need to go towards food democracy, where decisions in the agri-food systems are made more participatory, deliberative (Koc, 2016) and at the same time more empowering.

Along this line of thoughts, in recent years the use of organic production has been increasing. Organic production is defined as agricultural production without the use of artificial chemical fertilisers and pesticides and animals reared in more natural conditions without the use of drugs and antibiotics (Seyfang, 2006). By working with nature, rather than against it, the proponents of organic production are claiming that food quality is substantially improved, biodiversity enhanced, and land degradation reduced (Reed, 2001).

With the increase in organic production, over the past years an alternative approach has re-emerged in the international arena: agroecology, defined as ‘the application of ecological concepts and principles to the design and management of sustainable agroecosystems’ (Altieri, 2018). This definition also explicitly includes processes of continuous transition towards the ecology of food systems and the adaptation to the cultural, ecological and social specificities of the places where agroecology is applied (Anderson et al., 2019). Moreover, agroecology puts governance, power and democracy at its centre, emphasizing social and political aspects like autonomy, community-self organization, and bottom-up place-based organizing.

Though agroecology has been framed in certain cases only as a technical approach centred on specific production practices (which can be found for sure in the definition), FAO (2018) and Anderson et al. (2019) highlight how the social, cultural and political dimensions emphasizing community-led governance of transformations are as important as practical practices within agroecology.

Governments, scholars and practitioners are connecting agroecology to the notion of food sovereignty and just transitions, and they are basing this new approach to the re-affirmation of the right to food, the rights of the peasants, eaters and food producers. With the agroecological approach taking foot, there is a defocus on profit, technology transfer and climate smart agriculture, with an increased attention to the relationships between people and nature, and to the rights of the food actors. Therefore, when I talk about sustainability, I do not look only at the technical dimensions of the transitions of the agri-food systems.

As Anderson et al. (2019) point out, there needs to be a shift from top-down technocratic approaches towards bottom-up distributed ones. Sustainability can then become the motivation for new participatory and governance instruments to be used, in order to democratize decisions, legitimize implementations and results and reach a better society. Sustainability can be the motivation to social innovation and the right tool for change to happen. Therefore, sustainability becomes something more than just a simple end.

When this perspective on sustainability is taken, the concept of quality of products and services within the food systems is extremely important. In food marketing, approaches to quality range from objective approaches, usually through sets of measurable characteristics, all the way to subjective approaches where quality could be measured by consumers attitudes and behaviours (Brunori, 2007).

In the last decades there has been a trend in standardizing food products through normative and measurable approaches, without acknowledging that the inherent nature of food products is to be experienced while eating: the aesthetics of the food is important only up to a certain point (although the great efforts by the agri-food system actors to make it even more important). What is really fundamental is in fact the experience that every consumer has in his/her home. The food can be regarded either as a simple commodity, or, more importantly, as a relational good, i.e., a product that gains value also through the construction of social links and relations. There is a departure from a mere exchange based on price, to arrive to a more complex exchange based on common trust, social relations and diverse characteristics of quality.

All approaches to define and measure quality (Brunori, 2007) highlight that quality is the result of interplay between product characteristics, producers and consumers and that the gap between perceived and measurable quality is strong.

While from a standard economics point of view the gains from private and social comparability of goods are the driving force for standardization (Katz and Shapiro, 1985; Allaire, 2018), quality refers more closely to the act of consumption: here there is a distinction between goods in the market and the consumer use of goods in a process which is designed to obtain certain effects. With this view in mind, food products also start to include characteristics like tradition, origin, hygiene, health, etc. (Allaire, 2018).

As Ponte (2016) highlights, the definition of quality needs to be redefined and the identity of a product, and its related quality, can be guaranteed and institutionalized by the embedded social and cultural values of its region of origin. Berti and Mulligan (2016) highlight that, in its process of re-territorialisation, food quality comes from different attributes, like quality and safety,

sustainability and healthiness, and, finally, locality (distance between place of production and selling point).

This also implies a redefinition of how actors in the food systems engage with the markets and the surrounding environment. With the re-emergence of shorter supply chains, a topic which I develop further in this section of the chapter, together with alternative networks in food systems, sustainability takes a new meaning and embeddedness brings new values into the picture. New and different conventions and constructions of quality (Thevenot, 1998; Marsden, 2000) need to be considered when talking about quality and sustainability at local level.

Shorter food supply chains might in fact bring with them negotiations and choices between differing values, compromises between economic and non-economic objectives and at times sacrifices (Chiffolleau et al., 2019; see also the concept of self-exploitation in Galt, 2013). Food can be re-socialized and re-spatialized, and the consumer can make additional value judgements about what they buy, drawing from their knowledge, experience and perceived imagery (Renting et al., 2003): the quality of the food is then linked more directly to the rural characteristics, the cultural landscapes and the local resources, all embedded in the value of food itself, what according to Barjolle et al. (1998) the French would call the ‘terroir’ of agricultural production.

1.2.2. Territories and short(er) food chains

The development of alternative food networks has attracted much attention in recent years, with a growing interest for the source and processing of foods. This attention has also brought different perspectives and critical views towards the industrial mode of food production, linked to organized long industrial chains, processed unhealthy foods and large corporations, and it has brought the emergence of innovations which can ‘short-circuit’ (in the words of Marsden, 2000) the long, unsustainable industrial food chains.

Many scholars (Blay-Palmer et al., 2016; Marsden and Sonnino, 2012; Lang et al., 2013) are highlighting how, although pressures are at global level, perspectives in the food systems need to be implemented looking at localities and regions.

Therefore, the understanding is growing that place-based solutions would need to be considered to identify and respect local needs, and mobilize the appropriate resources, while on the other hand there is also a need to look at meta-scale structures for facilitating the necessary change (Blay-Palmer et al., 2016).

Marsden (2012, p. 2) cleverly states:

‘[W]hilst we clearly must not lose sight of the macro-global picture, we also need to realise that in order to imagine and plan realistic alternatives it is necessary to adopt a more creative eco-economy paradigm which re’places’, and indeed relocates, agriculture and its policies into the heart of regional and local systems of ecological, economic and community development.’

With the term Short Food Supply Chains (SFSC) is usually defined a food system or chain where the connection between food consumer and food producer is sensibly shortened compared to the industrial long food chains (Marsden et al., 2000). In these shorter chains, the product is reaching

consumers embedded with information, either showed on the packaging or the labels, or communicated directly at the point of retail. The consumer, in shorter food chains, is empowered in his/her decisions to buy food and can make associations and connections with the place and space of production: consumers, in shorter food chains, in general, have more knowledge on the values brought forward by the people involved in the chain and which production methods have been used. Therefore, short food supply chains are usually perceived as re-establishing authenticity in production and consumption (Lamine, 2015; Galli and Brunori, 2013), and, as I have shown before, they are also re-defining the concept of quality.

Marsden (2000) identifies SFSC with three characteristics: face-to-face, meaning that personal interaction between the consumer and the producer allows for an interchange of trust and authenticity; spatial proximity, meaning that products are produced and sold in a specific region, arriving to the consumer with the necessary information embedded in the food. The consumers are aware of the origin of the food; spatially extended, meaning that the information about the place of production is transferred to a different place, but the social control and embedded information is still part of the product and, although sold far from the place of production, the other two characteristics (face-to-face and relations of proximity) are transferred either through a label (or a certification), or through some form or symbol of social control.

Renting et al. (2003) highlight how the emergence of SFSC is in contrast with the neo-classical economics view of the market as something external to the social world: in fact, short food chains are the result of the active construction of networks by various actors in the food systems, and social interactions are fundamental for the construction of the markets, which are not necessarily driven only by prices and competition, but where coordination and quality take new roles.

One of the principal reasons for shortening and localising food chains would be to reduce the distance food travels between being produced and being consumed, therefore increasing the environmental benefits, but also economic and social reasons need to be taken into consideration (Seyfang, 2006): while globalized and industrial food systems usually separate economic transactions from social and environmental contexts, the new economy of food favours socially embedded economies of place.

This does not mean necessarily consuming all the food where it is produced or falling into the local trap (see Born and Purcell., 2006), but it certainly means going a step further towards shorter food chains where there is increased connections between consumers and producers, enhanced ethical and social capital around food, education of consumers on the source of the products and the creation of feedback mechanisms which are all absent or more difficult to achieve when food comes from distant origins: there is therefore a strengthening of local economies and social cohesion and control (Norberg-Hodge et al., 2000).

In general, short food supply chains are increasingly taken into consideration when rural and food policies are aimed at changing the agri-food systems and the related rural areas towards a greater sustainability (Galli and Brunori, 2013).

Therefore, these new diverse food networks can be an alternative, or they can be developed in parallel, to the logic of the global food economy (Whatmore and Thorne, 1997), and they can make

a significant contribution to rural development: shorter food chains favour new forms of associations, resisting the conventional price-pressures of industrial food systems and developing new methods and relationships, by looking at the value of food from different perspectives (Renting et al., 2003).

Shorter food chains are making sure that embeddedness highlights the aspects of the local context (Bloom and Hinrichs, 2011): social relationships might then be able to modify and mitigate the rules of a merely profit-oriented economic logic, which can at times disadvantage smaller farmers in the market, and they might create new economic spaces for sustainability transitions to happen.

1.3. Territory, governance and spaces of transformation

1.3.1. Coordination and governance

The spaces for governance and coordination of activities at territorial level, for achieving sustainability transitions of agri-food systems, have been a recurring theme throughout the chapter so far. Since the concept of governance has been used and developed in a very broad range of academic disciplines, I would like to bring some clarity to the concept and further elaborate on it.

When referring to governance, I tend to look at the definition from Andrée et al. (2019, p. 4), who talk of governance as

‘the relationships, processes, rules, practices, and structures (both institutional and discursive) through which power and control are exercised and decisions are made’.

This concept of governance, according to the authors (*ibid.*) takes the discussion beyond government and recognizes that diverse and multiple actors and perspectives should be taken into consideration for public decision making. This definition allows me to look at informal and formal associations, formalized procedures of state governments, hybrid structures of decision-making, or territorial arrangements for broader sustainability objectives through these lenses: biodistricts/eco-regions, food policy councils and city-region food systems are all declinations of governance, either as co-governance or polycentric governance. Some of them involve only certain actors (e.g., social movements, civil society, producers), while others are trying to involve additional ones in the food systems’ decisions (e.g., addition of public institutions and local governments).

Overall, the capacity of a territory to strengthen its symbolic and social capital towards a better positioning in global networks and higher sustainability is also the outcome of the actors in the territory to negotiating shared goals and agendas and their power to retain control on the production of the social representations of the area (Brunori and Rossi, 2007). This is influenced greatly by the definition and implementation of shared patterns of governance, for the achievement of the actors in the territory of a new consensus and the construction of institutions for an enhanced sustainability of the food systems.

Jessop (2002) already suggested that good governance is based on the ability to solve conflicts, facilitating communication among parties to reach an agreement about the social representations in the rural territory. Of course, the process of governance is not free from the risks of failure, but to achieve sustainability transitions and transformation of the food systems at territorial level, there

is currently a need to try renovated processes of governance. When rural change has been analysed (Brunori and Rossi, 2007), it has been highlighted how resources have been mobilized and alliances activated to construct new social representations of rurality or to change existing ones: Castells (1998) shows how in networks of information exchange and symbol manipulation, which relate social actors with institutions and cultural movements, power, defined as the capacity to impose new behaviour, is created.

When rural development needs to happen, Brunori and Rossi (2007) detect some key conditions, such as consensus among local social groups regarding shared social representations, the capacity of the local communities to turn consensus into specific formal and informal institutions (norms and routines, agreements, policy measures, etc.) (e.g. Nelson and Winter, 1982), which Goodwin (1998) calls mechanisms of coordination, and finally the capacity of local actors to create a new system of governance, which coordinates the relations between local, public and private agents, and which can interact with the outside (i.e. regulatory system, markets and society).

Since Bloom and Hinrichs (2011) find that local systems that combine conventional infrastructure with local production and consumption tend to prioritize market based considerations despite the local embeddedness, it could be interesting to see if in territorial arrangements (like bio-districts) we can see a mitigation of the economic logics disadvantaging small producers while still having the embedding of and high priority given to social and cultural local values (e.g. food security, social justice, etc.). Systemic change towards sustainability implies great changes to lifestyles and social behaviours and norms. Sometimes policies from the top might only dis-empower grassroots actors (Avelino et al., 2016) while empowering changes from the bottom would have their potential curtailed by their inherent nature of small scales (Lamine et al., 2012): governance tools for territorial scaling are necessary, to make sure social innovations, cultural and social change, empowerment, formalization of change are all exploited and used to favour a systemic change in the agri-food system realm.

Several important scholars analysed change and how transformation happen in society and the economy. What seems clear is that transitions in general, and, within them, sustainability transitions, require cultural change of shared values and common senses (Nelson and Winter, 1982; Ostrom, 1990; Gramsci, 2007¹). D'Alisa and Kallis (2020) cleverly state that grassroots innovations usually construct alternative spaces to the traditional regimes, but they also change the common senses, which are the result of identities and accumulation of experiences, and are also defined as

¹ Prison Notebooks, written between 1929 and 1935 – in this case, referenced to the 2007 Italian edition.

'uncritical and largely unconscious way[s] of perceiving and understanding the world that has become 'common' in any given epoch'

by Hoare and Nowel Smith (1971, p.322).

Therefore, practices at grassroots level might create new common senses and spread them to society, transforming institutions and producing or reproducing new ones.

The same process might happen within organizations which operate in local food systems (farmers or producers, being or not being part of organic regions or food policy councils), which might create new business models, nurturing new common senses, or new organizational routines, in the lexicon of Evolutionary Economics theory. Transformation, in these conditions, requires co-evolution of organizational routines and institutional routines.

Actors in the food systems should work for the definition of the governance mechanisms. Andrée et al. (2019) conceptualize the governance engagement continuum as a framework to compare and analyse the opportunities and challenges to food movement engagement with governance across context and scales (Fig. 1).

This framework could be used to analyse the methodology that food actors (incl. grassroots movements, farmers and producers, citizens, local governments) use towards sustainability transitions and transformation of food systems. The continuum goes from multi-stakeholderism to polycentric governance (incl. self-governance), passing through co-governance. The framework is used considering power and agency, and it includes a variety of situations, from weak engagement and empowerment of actors to strong engagement and empowerment.

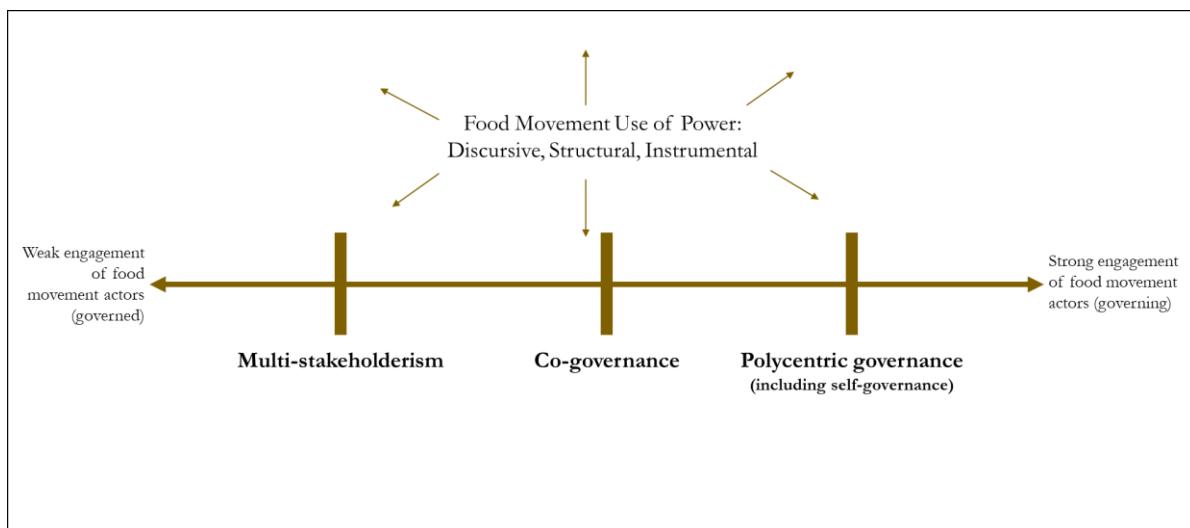


Figure 1: Governance Engagement Continuum (Andrée, 2019)

Co-governance is defined by Kooiman (2003) as 'multiple actors working together to meet shared governance goals, versus managing competing interests'. and it is increasingly used to involve non-state actors in the solution of complex public problems and by some scholars (Vivero-Pol, 2015). It is also seen as a way to realize the communing of food.

Although some authors are considering co-governance in policy processes definitions, the concept could also be used as an empowering mechanism for actors in the food systems towards sustainability transitions, since usually co-governance methods are increasing the sense of justices, fairness and perceived legitimacy of the decision-making processes and outcomes (Bingham et al., 2005).

Co-governance can also be defined as participative governance based on a partnership between the state, user groups and elements of the civil society (Symes, 2006). According to Jentoft (2003) co-governance challenges the hierarchical top-down management systems when dealing with decision making at local level. Symes (2006) highlights, among the benefits of co-governance systems, the fact that there is a stronger legitimization of the policy processes and outcomes, and at the same time an enhanced level of commitment and compliance among participants and actors.

Overall, then, the concept of co-governance, linked with an enhanced and genuine sense of partnership, is in line with the conceptual framework and directions of thought developed in this chapter, since it is designed to be flexible, reflexive and adaptive (Voss et al., 2006).

Most importantly co-governance is a tool used to bring forward social learning, new common senses and shared values among the different actors. Along the governance continuum identified by Andrée et al. (2019), and together with co-governance, polycentric governance is equally important.

The concept is at the end of the spectrum where strong engagement and empowerment of food actors is present. Polycentric governance has been developed by Elinor Ostrom during the 1970s and she defined it as organizational structures where a number of independent actors coordinate the relationships with one another under an agreed-upon set of rules (Ostrom 2011; Andrée et al., 2019). More specifically, she gave the following definition (Ostrom, 2010, p. 552):

‘multiple governing authorities at different scales rather than a mono-centric unit. Each unit within a polycentric system exercises considerable independence to make norms and rules within a specific domain (such as a family, a firm, a local government, a network of local governments, a state or province, a region, a national government, or an international regime).’

Ostrom noted that human life consists of a lot of different spheres of activity and that each sphere has an optimal scale. Therefore, optimal governance requires determining the optimal scale for each sphere of activity and coordinating appropriately among spheres. Thinking of large-scale society as a multicellular organism can help generalize and refine the concept of co-governance and polycentric governance which takes place in small groups.

Although Ostrom applied the concept of polycentric governance to the management of Common Pool Resources, what is important to highlight here are the concepts behind her idea. In fact, Ostrom (2010) believed that polycentric governance could foster ‘innovativeness, learning, adapting, trustworthiness, levels of cooperation of participants’, and the ability to achieve ‘more effective, equitable and sustainable outcomes at multiple scales’.

I believe that the concept of polycentric governance will be as important as co-governance when analysing the spaces and scales of transformation in the food systems.

In fact, though not offering a solution for all the problems, co-governance and polycentric governance might offer additional inspiring views to the current resistance to systemic sustainability transitions. Borrowing from Ostrom, I believe that various governance activities at different levels, arranged in a polycentric patterns, could have the potential to be highly complementary and transformative for the achievement of sustainability within local food systems.

Therefore, territorial governance arrangements and grassroots initiatives can be analysed through the lenses of co-governance and polycentric governance. Grassroots movements and enlightened farmers and producers, although building alternatives and changing their approach to food production, eventually will find themselves confronting with the established governance systems and the established regimes and institutions.

Working collectively, thorough governance and coordination mechanisms, they can strive to reach different business models (e.g., in the case of farmers and producers working together in biodistricts) and more democratic processes of engagement and decision making (e.g., in the case of grassroots movements and citizens in participating in biodistricts).

1.3.2. Sustainable food communities

Drawing on the thoughts and literature discussed so far therefore, I would tend to propose that, for proper sustainability transitions of the food system, there is a need to go closer to more inclusive and empowering governance and coordination solutions, where examples and structures of co-governance and polycentric governance can be applied.

Kitchen and Marsden (2009, p. 289) have coined the concept of eco-economy:

‘the effective social management and reproduction of ecological resources (as combinations of natural, social, economic and territorial capital) in ways designed to mesh with and enhance the local and regional ecosystem rather than disrupting and destroying it. The eco-economy thus consists of cumulative and nested webs of viable businesses and economic activities that utilize the varied and differentiated forms of environmental resources of rural areas in sustainable ways. They do not result in a net depletion of resources but rather provide net and composite benefits and add value to the environment and the community.’

Therefore, rather than just a local and regional value-adding phenomenon, the eco-economy of Marsden places an emphasis on the recalibration and clustering of microeconomic behaviour and practices, and it allows the capture of local and regional ecological and economic value. The eco-economy, according to the researcher, is happening in the rural web, which is a relational system through which human and ecological components of a territory interact and intersect. In the rural web, socioecological goods and services are linked to territorial resources.

The rural web can be seen in similar fashion to the concept of rural districts. Rural districts are defined as (Brunori and Rossi, 2007, p. 185)

‘local production systems characterised by a homogeneous historical and territorial identity due to the integration among agriculture and other local activities, which are coherent with natural and territorial traditions and vocations.’

The term has emerged in the 1990s in the agricultural economic literature as an adaptation of the concept of industrial district, which has been coined by Becattini and later developed by a large number of Italian regional economists and economic geographers. The concept of industrial district is focused on the connection between clusters of small local enterprises and the community to which they belong: the trust, generated by the social interaction in a certain territory, and a common sense of territorial belonging, brings specific innovation occurring in the area. The rural district is enlarging the concept of industrial district, adding the natural environment to the enterprises and civil society.

Brunori and Rossi (2007) identify the rural district's specificity in the relationships between local actors and the environment, which they say are embodied in the contextual knowledge, and they highlight how cultural landscapes, typical food and rural heritage are what form the key characteristics of a rural district.

Taking both the definitions of rural webs and rural districts, the agri-food systems are producing not only commodities, but also (and principally) food embedded with additional (social and cultural) values coming from the local environment. Within these views, food systems' actions and initiatives are seen not only as spaces of creation for more jobs or added value, but also as spaces where there is a reconstruction and re-valorisation of the agriculture and its region of production. All this is done thanks to the interrelationships with the local society and culture (Marsden, 2010).

Gibson-Graham (2006) see the economy as created in specific geographical contexts and in historically path dependant ways. This might lead to see community-scale farmer-to-consumer initiatives as creating new economies through relations of interdependence and mutual reliance between consumers and producers: this concept places itself well in the evolutionary economic geography of Boschma and Frenken (2006), which tell us that routines and institutions are context specific and need to be studied looking at different geographies.

Taking inspiration from this, Blay-Palmer et al. (2016) rethink the role for food, making it a platform for facilitating system-wide transformations at local level through networks of alternative initiatives to develop critical mass, either by reinforcing the individual size and effort of the single actors or to replicate approaches at territorial levels, from a community to a regional scale.

Blay-Palmer et al. (*ibid.*) introduce the concept of Sustainable Food Communities, where food systems' activities are mainly not-for-profit, they are consumer and civil society-driven, they have social motivations and whose main actors are community-based organizations or enterprises. The sustainable food community approach is therefore driven by social cooperativism and coordination, where different actors try to address the unsustainability of the food economic system: there is a creation of spaces where governance and coordination networks allow the participation of grassroots social innovations actors and alternative food initiatives, together with the civil society and organic producers, giving them the opportunity to share and bring their innovation potential (Levkoe, 2014).

Sustainable food community experiences could then provide a potential solution for approaching the sustainability transitions of food systems and offer the spaces where grassroots actors/innovators and institutional actors get together to share solutions for local sustainable

development. Following on this, it might be interesting to understand whether bio-districts, food policy councils and city-food system regions, could offer opportunities to bridge social economic and environmental goals through governance and coordination, and help disseminate good practices and empower actors through networking (Blay-Palmer, 2016).

Rather than being merely a benchmark, therefore, sustainable food communities should provide frameworks and spaces where practices, best suited to the place-based capabilities, are shared and implemented towards the sustainability transitions of the local food systems.

1.3.3. The concept of meso-space

The need for a more critical and grounded relational approach to food systems transformation has been recognized by scholars recently (Moragues-Faus and Marsden, 2017), together with the need of understanding transformation crises and successes, and their uneven dynamics when looking at different spatial scales. Although conventional agri-food narratives have focused their analyses on placeless foodscapes, it is rightly argued by several scholars (Blaikie, 2008; Goodman et al., 2012; Braun, 2005; Heynen, 2014) that food system transformation studies would benefit greatly from re-embedding food's materiality, agency and meaning into the concept of place.

Here, transformation is intended as the term that fully captures the radical and non-linear nature of a systemic change (Kanger and Schot, 2019). Therefore, by following also on the approach of similar studies (Chaminade and Randelli, 2020), I talk about transformations when I discuss of more substantial changes from previous situations of the food systems, with modifications to practices, routines, beliefs, and policies concerning food production, distribution, consumption and disposal systems. I still accept and embrace the definition of sustainability transitions, seen as an incremental and fluent change towards a slightly improved and evolved situation (Folke et al., 2010). In fact, although transformation might be seen as a more substantial change to the status of things, the term transition is also seen as a fundamental transformation toward more sustainable modes of production and consumption (Markard et al., 2012). Seyfang and Haxeltine (2012) refer to transition when talking about a comprehensive system-wide societal change. Therefore, although I use transformation in the title and across the chapter, and I intend it as a more impactful change, in some cases I will use interchangeably also the term transition, being the terminology of sustainability transitions and transformations not always so clear-cut in the literature.

When discussing about food system transformation, Renting et al. (2008) bring forward the integrated territorial paradigm, which aims to reinforce the capacity of food systems to re-value specific territorial resources and social relations of proximity. This approach therefore is in stark contrast with the process of placeless standardization of the dominant agri-food systems which tend to promote a generalised model with a universally claimed validity: agri-food systems in the integrated territorial paradigm are embedded in the distinctive characteristics of the territory, and they are integrated with activities such as environmental conservation, tourism, care, education, etc. (Watts et al., 2005; Renting and Wiskerke, 2010). By basing food production increasingly on local physical conditions and socio-cultural traditions, the integrated territorial approach is also seen as the approach to improve consumer trust, using tools of proximity and reinforced social embeddedness (Renting et al., 2003).

One of the limitations of this approach, though, as also anticipated in previous sections, is the fact that, usually, existing successful initiatives remain relatively small and localized, with unclear solutions for upscaling or multiplying. Moreover, the combined role of public, private and civic actors in creating support strategies is largely unexplored, together with the big bottleneck given by the fact that, in general, existing successful initiatives at local level for food system sustainability develop outside (and often in opposition to) existing policy frameworks (Renting and Wiskerke, 2010). For this reason, it is important to explore hybrid organizational forms which preserve elements of the localized initiatives but are also able to reach a wider audience, e.g. local institutions and systemic change.

The concept of hybridity has also been used to analyse connections between alternative and conventional food systems: several authors (Sarmiento, 2017; McCarthy, 2006; Whatmore et al., 2003) have discussed and shown how alternative and conventional food systems are in fact interrelated and mutually dependant, therefore changing the complexity and structure of the conversations on strategies and practical activities to scale up sustainable food systems. Going over the dichotomy of alternative (good) and conventional (bad) food systems could also help scholars start thinking of real ways to implement large-scale transformation (Alkon, 2013) and help them rethink their scalar assumptions for multiplication of sustainable practices at local level: local and global are still recognized, and local could still be the preferred level where actual implementation of sustainable solutions, drafted at a more global level, is easier to implement and more impactful, but there is also a strong recognition that there are solid lines of flow which transgress the categories of alternative and conventional, and that connectivity between the ‘two worlds’ is essential (Whatmore and Thorne, 1997). Sarmiento (2017) highlights how having hybridity at the forefront when discussing about food systems transformation can help focus the attention to pragmatic, strategic and logistical elements of scaling up and out.

Several other scholars (Blay-Palmer et al., 2016; Marsden and Sonnino, 2012; Lang et al., 2013) have also highlighted the fact that, although climate change problems and certain agri-food issues are at global level, perspectives in the food systems are to be developed and activated looking at localities and regions. Blay-Palmer et al. (2016) state the need to look at meta-scale structures for facilitating change, identifying and respecting local needs while at the same time mobilizing appropriate resources at national and institutional levels. Marsden (2012), moreover, highlighted the need for a ‘re-placement’ and ‘re-location’ of agricultural issues and policies into the heart of regional and local systems, giving the necessary attention to ecological and economic aspects in community and territorial development.

Moreover, this ‘renaissance’ of the territory and the local systems goes hand in hand with the re-definition in the literature of Short Food Supply Chains (SFSC) (Marsden et al., 2000), which are defined as food systems or chains where connections between consumers and producers are shortened, favouring sustainability when compared to the industrial long food chains. Renting et al. (2003) also showed the importance of SFSC, where there is an active construction of networks by various actors in the food systems and where markets are based also on social interactions, therefore bringing to the forefront the embeddedness of coordination and quality. Seyfang (2006) reinforced the concept by showing how a new economy of food is necessary, one that goes in a

different direction than globalized and industrial food systems, and towards socially embedded economies of place.

Therefore, regional and local governments should increasingly take a role for policy development, with metropolitan regions, cities, and rural areas all actively contributing in the agri-food related policies. Hassanein (2008) talks of a new food geography reflecting a territorial approach, opposed to the conventional global approach, where there is an integrated conceptualization of food and where food is more than a mere commodity: food becomes a product and process connecting environmental quality, social issues, public health, education, etc. This new food geography is strictly linked to the previously mentioned integrated territorial approach and it has great implications also on policy planning since, while before a policy could just be considered synonymous with agricultural and rural policy, now policies cross boundaries and affect environment, public health and food quality, interconnecting and touching upon different social actors and themes. While a sectorial approach has dominated policy making for decades, integrated policymaking will be essential to make sure food systems will be transformed towards sustainability touching all the necessary sectors and involving the right actors. Given the complexity of the food system transformation Renting and Wiskerke (2010) are advocating for new governance modes for agri-food transformation, where state agencies, market parties and civil society groups all play an important function.

Kersbergen and Waarden already in 2004 pointed out how, in general, the role and importance of the nation state as policy maker and legislator was weakened, with the legal frameworks for European agriculture and food being formulated in Brussels, and with these frameworks being applied and implemented at regional and local level. Lower administrative levels in policy making and most importantly in implementation are therefore gaining more and more prominence, with a vertical shift in governance, and at the same time certain responsibilities like food quality and safety (Kirwan et al., 2017; Hassanein, 2008) are becoming shared between government and private actors, with a horizontal shift in governance. Adding to this, the role of civil society is becoming increasingly important, especially when discussing about food democracy and food sovereignty (Renting and Wiskerke, 2010), and civil actors play key roles along established public actors.

The role of public-private partnership and coordination has also been analysed and highlighted within the innovation systems approach (Hekkert et al., 2007; Favillia et al., 2018). The approach has been used as frame for understanding innovation processes, especially when these processes are context-dependent and complex, involving various actors along the activities from inception to realization. According to the scholars studying this approach, interactions within a given innovation system depend on strong coordination mechanisms and motivated public intervention, but this is more so when considering innovation at territorial level: private and public sectors have to cooperate to co-govern innovation processes. Therefore, when territorial innovation is analysed (Stewart and Hyysalo, 2008; Favillia et al., 2018), success is favoured when good governance involves various sectors and actors, and where inclusive participation is implicit in the structure and processes of territorial innovation.

Public-private partnerships, territorial bottom-up approaches and active citizens' involvement are key elements for new governance modes which aim at growing diversity of involved institutional

and societal partners. This change in the approach to local sustainable development, in fact, also requires a shift in governance. According to Jessop (2006), governance can be defined as a coordination system aiming at finding solutions to certain problems, through dialogues between different actors. This dialogue, in a territory, is based on negotiation, sharing of resources and common action. When governance at local level is considered, all the interactions in the territory which create government choices need to be considered as well.

According to Favilla et al. (2018) social innovation in a multi-actor governance includes both private and public coordination. In territorial contexts innovation starts from the alignment of common problems, identification of shared strategies and realization of collective and coordinated actions, with the strong involvement of the public sector. The authors, when looking at innovation at territorial level, identify three levels of interaction and coordination: the first level is co-production, where a common narrative is developed, identifying problems and goals; the second level is co-management, where cooperation is widened to all actors and organizations in the territory, starting to organize concrete projects; the last level is co-governance, where strategic partnerships between public, private, social and third sector actors are established and where shared decision making processes are activated (Koopmans et al., 2017).

For the new envisioned food economies embedded in local spaces social relationships and contexts are therefore essential: Bloom and Hinrichs (2011) highlight how social relationships at local level can foster the modification and mitigation of the rules of the agro-industrial system, departing from a purely profit-oriented logic and going towards new economic spaces where social, environmental and economic sustainability are all considered. Since systemic change towards sustainability in general implies great changes to lifestyles and social behaviors, there is a need of spaces where this change can happen by making sure that both single actions and systemic institutional norms are changed at the same time.

Also, Hansen and Coenen (2015) underline the central importance of inter-organisational relations within a territory fostering sustainability transitions. The scholars, analysing the literature on the geography of sustainability transitions, state that different perspectives on the spatial dimension of relations between actors can be found: although some scholars (e.g. Raven et al., 2012) look at space as a socially defined concept , drawing on relational geography, in general scholars within evolutionary economic geography (Coenen et al., 2010, Ornetzeder and Rohracher, 2013) stress the positive influence of geographical proximity in stimulating network formations for sustainability transitions. The key factor highlighted by the scholars, is that geographical proximity fosters face-to-face interaction, facilitating the formation of social connections, network links, and social cohesion.

In this context, within the literature of sustainability transitions, the social cohesion of a territory has been often highlighted as an important driver and characteristic fostering the activities towards higher sustainability of a community (Forrest and Wiek, 2014 and 2015; Luederitz et al., 2017; Gorissen et al., 2018). Social cohesion is defined as the degree of solidarity, trust, and association among the local community of a territory (Forrest and Wiek, 2014), and the presence of shared values among the members of a community (Klein, 2013). Social cohesion is measured through the level of interaction among community members, the level of mutual trust, and the perceived

willingness to place community interests over individual interests. With new food economies embedded in territories and local spaces, understanding, and measuring the social cohesion of a territory is important to also assess the potential of the same territory or its communities to transform towards sustainability. The recent recognition of environmental and climate change issues, certified at international level (WCED, 1987; UN, 1992), has been developing together with new social movements aiming at finding solutions and new models centred on local productive systems. A come-back to the territory as survival and re-birth has also been developing in Italy with the concept and the diffusion of industrial districts (Becattini, 1990). Following on this, the re-contextualization of socio-territorial values for economic activities has grown in importance, together with the emergence in the corporate world of the Corporate Social Responsibility (CSR), by integrating social and ecological issues in the economic activities of the firms and in their relationships with the various stakeholders.

Along these lines, De La Pierre (2018) is interestingly proposing to go over the CSR concept, towards a more robust and solid territorial context. Indeed, the scholar is questioning how a single firm could change the course of the current environmental depletion, given the complexity and vastity of the climate change-related problems. For this reason, he is proposing to focus the attention on the concept of Territorial Social Responsibility (TSR), which is a re-valorisation of common values and principles aiming at increasing environmental and human wellbeing, by all social, economic and institutional actors at local level (Peraro and Vecchiato, 2007). These common values and principles should then be consolidated and directed through strong social networks and relations among the local actors. Following this concept, therefore, the territorial community is coming to the forefront, and the social and relational capital of the territory appear to be fundamental for the regeneration and transformation of the local systems.

In the literature it has been discussed how pure top-down policies for sustainability could potentially create disempowerment in the actors at the bottom level (Fraser et al., 2006; Avelino et al., 2019). Territorial, bottom-up initiatives are instead considered important for the transition to a sustainable society because of their ability to engage and empower local communities in way that top-down solutions often fail to do (Seyfang and Smith, 2007; Forrest and Wiek, 2014). At the same time though grassroots innovations, while having great empowering potential in small niches, usually have the drawback of staying relatively small in scale: for this reason, governance tools and spaces at territorial level are necessary, where social innovations, cultural and social change, empowerment, and formalization of change are happening to favour systemic change.

These governance spaces could in fact be meso-spaces for transformation at territorial level: spaces placed between grassroots innovations (brought forward by citizens, firms and consumers) on the one hand and institutions (represented by administrations, policy-making, accepted social norms, laws etc.) on the other hand.

Meso-spaces of transformation at local level, especially in the context of food systems, could provide the spaces for the spreading of grassroots innovations and at the same time the transformation of institutions: organizations operating innovatively in local food systems, like organic farmers and producers, might create new business models and organizational routines, which are shared in meso-spaces at territorial level like biodistricts and organic regions, while at

the same time local administration representatives are participating in these spaces, making sure to then institutionalize the practices which are sustainable but also already accepted at the bottom level.

According to Banjade et al. (2007), meso-level spaces are all those below the national level policies and above the local-level management actions: meso-spaces are therefore bridging the two levels and are mediating policy implementation. The scholars, in this case, find a space where there is an intersection of state, market, civil society, and the ecological systems, where a nuanced and mediated governance happens: all actors at this level can mediate policies, influence social and environmental outcomes, implement policies, and provide feedback to policy formulation processes.

These meso-spaces can also be regarded as spaces of co-governance (Kooiman, 2003; Vivero-Pol, 2015), where several actors are working together to meet shared governance goals and where non-state actors are increasingly involved for the solution of complex public problems. Co-governance in meso-spaces can therefore be used both for policy definition and for empowering and consolidating sustainable practices of local actors in food systems. Co-governance, also defined as participatory governance (Symes, 2006; Jentoft, 2003), by challenging hierarchical top-down management of decision making at territorial level, puts together the state, user groups, firms and civil society. Symes (2006) has highlighted how, by utilizing co-governance, there is a stronger legitimization of policy processes and outcomes, together with a stronger sense of commitment and compliance to newly established practices among participants and local actors. Therefore meso-spaces of co-governance placed between grassroots and bottom levels and institutions could provide, in theory, spaces for food system transformation towards sustainability, where social learning, new common and shared values and new practices of organic agriculture are brought forward and established.

Sustainable development then becomes the result of a cooperative process (Bobbio, 2002; Lieto, 2013), where local organizations and institutions must necessarily talk to each other horizontally and where there needs to be open processes where the receivers of certain decisions are also influencing the content of the decisions, so that the sustainable development goals can be really implemented and reach coherently.

Participatory governance, in this context, would become essential (Agnoletto et al., 2007; Forno and Graziano, 2014; De La Pierre, 2018), and it needs to be brought forward by the local community or through any other co-governance instrument, e.g. a biodistrict or organic region. According to Demartini (2009) local farming firms and artisanal small medium enterprises would be keener to favour a TSR, given their strong rooting in the territories where their activities take place, and given their ease in building communitarian local relations.

Meso-spaces, in this sense, could help the territories in making a leap towards transformation, by providing the solution needed to go from individual CSR strategies of the firms to a common TSR (Gottardi, 2007; De La Pierre, 2018): in fact, while in a CSR context, firms act individually and isolated, interacting alone with their stakeholders and the territory, in a TSR context the local

community could take a leadership role, by being the one interacting with the different stakeholders and by making sure that all the relevant actors are involved.

Meso-spaces and, specifically in this thesis, biodistricts, could potentially be drivers of territorial transformation of food systems, by providing a space where TSR is developed and implemented, and where real change happens.

1.3.4. Spaces of agroecological transformation

When addressing the complex issues of the current situation of food systems a holistic and systemic approach is necessary an approach which considers social, environmental and economic aspects, while at the same time it also considers organization and efficiency of supply chains and markets, communication and coordination among stakeholders and farmer-consumer relations (Wezel et al., 2016). To do this, and to be able to properly address the topic of agrifood systems' transitions, Lamine et al. (2019) have advocated and proposed to reconnect agriculture, food, environment, and health by looking at the territorial scale, either through place-based approaches (Sonnino et al., 2016) or through broader definitions of territories, like agroecological territories (Wezel et al., 2016), or through a combination of the approaches.

The scholars also call for an integration of social and ecological dimensions, which go over the mere simplification of sustainability as defined as 'only organic production'. This shift from organic agriculture to include social and ecological aspects, with the related more complex dimensions, is advocated through the call for a change in scale for sustainable agricultural systems: a change from plot or farm level to landscape, so that complex ecological processes implied in biodiversity, population and, in general, territorial dynamics can be considered (Lamine et al., 2019; Martinez-Gonzalez et al., 2009). Therefore, by taking a landscape or territorial approach (and scale), one can more easily reconnect agriculture with the environment, food, health, and social issues, and, for this reason, one can also more easily analyse which characteristics define transitions towards sustainable food systems, as opposed to "only agricultural" systems. In fact, the territorial scale is a suitable one for analysing social and economic processes within food systems, which are formed and influenced by social, health and environmental loops (Sundkvist et al., 2005) linked to the implementation of public policies or to the implementation of local actors' initiatives. At the same time, the territorial scale also allows for the meaningful involvement, both in the research and in the actual transformation process, of the different relevant actors participating throughout the agri-food systems (Popa et al., 2015).

The territorial approach has been recognized as essential by several international organizations (OECD, FAO, and UNCDF, 2016): for policies to be effective on one hand and for local sustainable initiatives to be diffused systemically on the other, also regional differences must be considered. Given the multidimensional complexity of the food systems transformation, multi-stakeholdership and a combined approach (top-down and bottom-up) need to be considered instead of just addressing the issues at stake solely with top-down approaches or with 'one-size-fits-all' approaches. For this reason, also drawing on the OECD New Rural Paradigm (OECD, 2006 and 2016), a holistic territorial approach could provide the right level of analysis for tackling the issues at stake and for finding the right solutions. The territorial approach at the same time

would favour the co-ordination and diffusion of the relevant sustainable sectoral policies and it would favour coordination among the different levels of government.

The territorial scale, then, can serve as a meso-scale or meso-space, where, according also to Lamine et al. (2019), transformative processes happening at smaller scales (happening at the level of, e.g., organic farms, consumers, associations) can be considered along with transformative processes at macro-scales (e.g., global economic and/or environmental changes, or happening at the level of, e.g., institutions, either local or at national or international level). The territorial scale, and, in this regard, governance spaces at territorial level such as biodistricts (or, for example, Food Policy Councils) allow for an easier identification of the institutions and actors which need to be involved for an agri-food systems' transformation towards sustainability.

The local communities and their food systems allow for the embeddedness of responsibility, trust, and relations, while also allowing for a re-rooting of food in a space (the local space) which enables and/or constrains production and consumption through its territorial (socio-economic, cultural, and environmental) characteristics, therefore also reconnecting food systems with place-oriented socioeconomic and ecological dimensions (Hendrickson and Heffernan, 2002; Barham, 2003; Feagan, 2007). Although regions, places and territories are constructed concepts (i.e. defined through geographical and socio-cultural dimensions), they have gained an increasing role also at EU level, through its development and financing schemes and they are considered dynamic and contingent upon agency relations at the grassroot level and structural relations at the institutional level: territories are therefore regaining their necessary legitimacy as spaces of change within the global capitalist processes (Agnew, 2000; Paasi, 2002; Feagan, 2007).

For all these reasons, although local food systems cannot be expected to completely replace larger-scale agricultural production and trade as the primary source of food worldwide, they can for sure represent an opportunity for supplementing and complementing larger-scale food systems (Anderson and Cook, 2000; Feagan, 2007). Also following on Bellows and Hamm (2001) and Feagan (2007), there is the need for an integration of local and non-local, conventional, and sustainable, in order to be able to face the realities of the complexity of food systems, and in order to restructure and take decisions about local network arrangements towards a higher sustainability, while also considering the necessary interdependence of the local scale with all the other spatial scales and dimensions. The mesoscales and meso-spaces of transformation at local level, exemplified by biodistricts (but potentially represented also by other spaces, which are in necessity of further analysis and research), can therefore represent these spaces where food systems can be studied, understood, and potentially, eventually, changed and transformed.

Along with the regained importance of a territorial approach, the concept of agroecology has also regained traction in recent years. Agroecology as a concept has existed for many years: the concept has emerged in the 1930s, with further definitions in the 1960s, and the expansion of the concept as scientific during the 1970s and 1980s. In the 1990s agroecology became institutionalized and recognized at international level and in the last two decades the definition has been broadened, going from a scale of 'plot and farm' to an approach entailing the whole food system (Wezel and Soldat, 2009).

Agroecology is defined as ‘the application of ecological concepts and principles to the design and management of sustainable agroecosystems’ (Altieri, 2018), therefore looking at the ecology of food systems and entailing a process of continuous transition that does not necessarily follow prescriptive rules, but is based on core principles, values and elements which place the food systems in the cultural, ecological and social dimensions of the places and territories (HLPE, 2019; FAO; 2018; Nyéléni Movement for Food Sovereignty, 2015; Anderson et al., 2019). Agroecology is the concept and approach which, potentially, can enclose and consider, within its definition, all the characteristics and elements which have been mentioned before in this section, taking into account territorial, socio-economic, and more-than-organic aspects of food systems’ transformation: agroecology in fact goes beyond demands for mere technological and/or technical change and acknowledges the complexity of food systems and the necessity of addressing socio-economic issues along with political-economic power dynamics. Social and political aspects including autonomy, community self-organization and bottom-up place-based organizing are all emphasized, and, for this reason, agroecology offers an interesting perspective on the approach towards food systems’ transformation (Anderson et al., 2019).

Different interpretations of agroecology have been discussed in the last few years: agroecology as a science, movement, and practice (Wezel et al., 2009; Wezel and Jauneau, 2011), agroecology as a transdisciplinary, participatory, and action-oriented approach (Mendez et al., 2013) and agroecology as policy (Gonzalez de Molina, 2013; Sevilla Guzman and Woodgate, 2013). In general, though, it is important to highlight that agroecology has emerged as a framework which enables the analysis of the complexity of all dimensions of food systems (Wezel et al., 2016). As also previously mentioned, it is now acknowledged that focusing only on the farm-scale and the technical solutions cannot achieve a sustainable agri-food system (see also United Nations Environment Programme, 2012).

A strategy linking farm-scale activities with a territorial and landscape approach is then necessary, making sure that rural and territorial development policies are considered together with the embeddedness of food systems at local level: for this reason, and following along the research of Wezel et al. (2016), when discussing about governance spaces, meso-spaces of transformation and biodistricts, it might be extremely beneficial to adopt the definition of ‘agroecology territories’, defined by the scholars as ‘specific areas in transition towards sustainable food systems’. Territory is ‘the projection on a given land of specific structures created by a human group, which includes the way to delimitating, managing and organizing the land in question’ (Brunet et al., 1993), its history and cultural roots, and it refers on the one hand to the area under the responsibility of local authorities, such as municipalities (‘aree comunali’ in the Italian context), and on the other hand to the area where communities or sociotechnical networks of stakeholders interact among them and with the different landscape elements (e.g. natural or agricultural dimensions) (Callon, 1986; Elden, 2010; Painter, 2010).

Therefore, agroecology territories are places engaging in transition processes towards sustainable agri-food systems, aiming at improving the conservation of biodiversity, the adaptation of sustainable agricultural practices, and the development of sustainable food systems in general, embedded within local territories (Wezel et al., 2016). Wezel and its research team (2016) also

specify how farm and landscape approaches need to be integrated within an agroecology territory, being sure that farmer-to-farmer and farmer-to-consumer knowledge and practices are shared, but at the same time making sure that regulatory policies are also in place to institutionalize change and sustainable agricultural practices. An agroecology territory can therefore be strictly linked to the concept of meso-space of transformation, previously mentioned in this section and thoroughly detailed in chapter 2 of this research, and it can be also linked to the concept of biodistrict.

Following on the regained importance of the concept of agroecology, the Food and Agriculture Organization of the United Nations (FAO), along with the 10 principles of Agroecology (FAO, 2018), has also developed an assessment tool to collect and assess harmonized evidence on agroecology at territorial level: the tool, called 'Tool for Agroecology Performance Evaluation' (TAPE), is based on various already existing assessment frameworks and aims at measuring the multi-dimensional performance of agroecological systems across different dimensions of sustainability, therefore taking into account the complexity and diversity of food systems (FAO, 2019). Although the tool applies an approach at farm level, it also allows to collect information and provides results at territorial scale, comparing the performance of agricultural systems, over time or at a specific time: the results of the assessment can therefore be used to direct public investments and local actions towards more sustainable agri-food systems.

Being the territorial level increasingly seen as the decisive level for fostering agroecological transformations (Anderson et al., 2019), since it is the level where actors, new practices, and political agency come together and where food producers' strategies and consumers' practices directly interact with state policies (Van der Ploeg, 2018), it allows for a deepening of democracy and for a decentralization of power and governance: a territorial approach, by looking at meso-spaces as blurred spaces where consumers practices and producers' strategies on the one hand and institutional actors and programs on the other intersect and interact, can provide the right place to favour food systems' transformation towards sustainability.

1.4. Discussion: new spaces for sustainable transformations

Sustainability transformations are best understood and tackled when considered as place-based societal changes driven by local actors: as highlighted also by several scholars (Lam et al., 2020; Horcea-Milcu et al., 2019) this includes the development and implementation of sustainability initiatives by local actors that realise local and global worldviews, mind-sets, and values.

Therefore, sustainability transformations within food systems are potential local solutions to sustainability problems with global relevance (e.g., biodiversity loss, health, etc.) and they are crucial because they can shift dominant regimes onto more sustainable pathways, fostering transformative change (Pereira et al. 2018; Lam et al. 2019).

According to Ingram (2018) niches defend radical innovations such as alternative agricultural production methods or particular ideologies and they operate outside established structures, cultures and practices: therefore, niches are important sources of ideas and practices which can seed a transformation in the socio-technical regime, if processes at niche, regime and landscape levels of the system are supportive (Kemp et al., 1998; Schot and Geels, 2008). Regimes usually resist change, and, within the agricultural context, the dominant agri-food regimes exhibit

technological, organisational and institutional lock-in that ensure their persistence (Ingram, 2018; Seyfang and Smith, 2007) and result in only incremental improvements in sustainability performance (Seyfang et al., 2014).

Scholars and practitioners are starting to acknowledge the fact that one solution or one side alone cannot have systemic change towards sustainability. Policies, civic engagement, activism, and firms' transformations are all equally important and need to be brought forward in a framework of intelligent planning. This vision, as highlighted by Lamine et al. (2012) also allows to go beyond 'alternative' and 'conventional', and start to adopt an integrated vision, which focuses on relations developing among all relevant actors in the new food environment. This new model, while acknowledging that some important legal frameworks and policy decisions are taken in Brussels or at national level, also acknowledges the importance of local systems: lower administrative and local levels are fundamental for policymaking and, especially, for implementation and impactful action.

For sustainability transitions to happen, therefore, it is clear that new forms of territorial arrangements are then necessary. As it has been discussed in previous sections, governance and coordination are some of the main tools for empowerment, development and change. Sustainable food communities (Blay-Palmer, 2016) might enhance the valorisation and creation of social capital, and, together with participatory and empowering processes, they might re-create the necessary spaces for sustainability transitions (Pugliese, 2015).

The analysis from the literature in this chapter has made clear that an empirical analysis of spaces of transformations at local level would greatly benefit the overall understanding of the research community on the topic of sustainable transformations of food systems. By looking at biodistricts as examples of spaces where social and economic meanings might be transformed and recreated, and where sustainability transitions could happen, I believe I will partly fill an important gap in the sustainability transitions literature.

The empirical analysis in chapter 2 and 3 will look at the relationships, processes, rules, practices, and structures (both institutional and discursive) through which power and control are exercised and decisions are made in the biodistricts, and it will also analyse whether there are shared visions and expectations and a wide network of stakeholders supporting the biodistrict's emergence.

Biodistricts, according to the International Network of Eco Regions Associations (IN.N.E.R.) are territories 'naturally devoted to organic, where farmers, citizens, public authorities, realize an agreement aimed at the sustainable management of local resources, based on the principles of organic farming and agroecology.'

The concept of biodistricts can be seen as the operationalization of economic development compatible with the sustainable use of natural capital (Schermer, 2006). Biodistricts aim at establishing common sets of values, shared by economic and societal stakeholders in a certain area, supporting a sustainable lifestyle and rural development (Stotten et al., 2017) and usually regions with these experiences are aiming at coordinating organic aggregations of the actors in the food systems for the development and transfer of the values of organic agriculture to the economic and societal actors in the wider community (Schermer, 2006).

The International Federation of Organic Agriculture Movements (IFOAM) has defined certain values for organic agriculture, and these values, although including the necessary technical specifications and legal obligations for certification (when wanted by the farmers), are going beyond merely agricultural practices. The values enumerated by IFOAM (Stotten et al., 2017) are based on four principles:

- Health, meaning that organic agriculture should sustain health of soil, plants, animals, humans and the planet;
- Ecology, meaning that living ecological systems and cycles should be sustained;
- Fairness, meaning fairness to common environment and life opportunities;
- Care, meaning the protection of the health and wellbeing of current and future generations.

This definition of organic is therefore not only a sustainable way to produce food, but a holistic approach which could contribute to territorial development and sustainability transitions of the whole region where organic agriculture is applied (Pugliese, 2015; Stotten et al., 2017), strengthening local value chains and the local economy.

In biodistricts civil society not only could influence the actions happening within the territories but, in most cases, it is present in the Participatory Guarantee Systems² and in the governance methods within the biodistricts. Efficiency in production and specialization are just one of the many principles pursued by the actors which are part of the territorial arrangement: social and environmental sustainability is as important as economic sustainability. Therefore, there is a departure from the productivist schemes of the neo-liberal economy, and there is a step closer to a new moral economy, where cooperation wins over competition and where the acceptance of and presence in the deliberative processes of the consumers and civil society is fundamental for the healthy living of the territorial production and consumption arrangements.

Chiffolleau et al. (2019) have found that new economic patterns in two bio-districts in France and Italy have been created, with a blurring of the distinction between producers and consumers, which are not anymore seen at the two opposite ends of the chain but are getting closer together. The actors involved in the development of these organic regions have acted together, comparing prices, calculating costs, setting shared goals and supporting the shift from utilitarian-private values to new economic models based on the defence of common goods, in a way going towards the concept of a moral economy and sustainability (Chiffolleau, 2019).

² Locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange. Source: IFOAM, 2008.

In the next two chapters of the thesis therefore, by analysing biodistricts in Tuscany and in general in Italy, I analyse territorial spaces of transformation towards sustainability as spaces of governance, where civil society and private firms participate as main actors, with the optional participation of the state and where different rules for governing, deliberation and legitimization apply. With spaces of transformation I intend relational spaces positioned between the individuals, civic actors and firms on the one hand, and institutions on the other. In other words, these spaces of transformation might be governance spaces that would allow the different actors to coordinate and cooperate for the production, distribution and consumption of more sustainable food.

With governance, as highlighted before in the chapter, I refer to the structures, processes, rules and traditions that determine how different actors make decisions and share power, exercise responsibility and ensure accountability (Patterson et al., 2017).

It is therefore interesting to understand whether territorial spaces for food transformation represent an opportunity for local sustainable initiatives to be strengthened and spread further to a wider audience at local level. In other words, it would be interesting to analyse whether governance spaces of transformation would be able to work as a ‘solution spaces’ (as defined by Haasnoot et al., 2020), able to accelerate prevention and adaptation action to climate change. Along with this, it might be also important to study whether the (direct or indirect) participation of representatives from local institutions (responsible for policymaking at local level and for implementation of certain national policies) within these spaces would help them in becoming more transformative, through processes of replication and up-scaling.

The hybridity of these spaces is also related to the capacity of public and private institutions to cooperate for the same goal of developing a sustainable local economy. In the case of biodistricts, local authorities such as municipalities and province governments represent the public. It follows that the hybridization happening within these spaces can also allow going beyond a criticism of existing local sustainability initiatives to develop outside policy frameworks or in opposition to current agri-food system.

Considering biodistricts as territorial governance spaces of transformation, where sustainable organizational routines of the actors are shared and institutional routines for sustainability are influencing the organizational routines of participants (when using the taxonomy of evolutionary economic geography), is interesting also because it is following along the lines of the relatively new European regional policy, which is promoting a territorialized and place-based approach (Barca, 2009).

In this context, these spaces promote local development through flexible structures, multilevel (or self-) governance and the participation of local actors along the food chains (Pugliese et al., 2015). These elements then favour more sustainable production and consumption processes, thanks to the shared local culture and knowledge of the involved actors and to the networking, that brings together different local agencies (Assael and Orefice, 2016). Biodistricts therefore, as spaces of social, economic, and environmental transformation, might provide spaces where experimental sustainable practices at local level are shared among actors and institutionalized at social and political level (Assael and Orefice, 2016).

These hybrid spaces, placed between grassroots actors and institutional actors, could allow to increase food sovereignty of local communities and to have a higher impact on the current food regime which many sustainable innovations were able only to affect superficially.

Governance spaces at local level, therefore, might favour the transformation of local food systems towards sustainability: these spaces could offer some solutions for going over the two main criticisms of local sustainable food initiatives, i.e., one, a lack of dissemination and multiplication potential of successful initiatives and, two, a weak link with policy frameworks. Due to the spatial and cultural proximity of the actors within them, these spaces could promote autonomy of local initiatives, sharing of knowledge among actors, and sustain public local support (Pugliese et al., 2015), while still making sure that a wider audience is reached and that learnings are used for fruitful policymaking.

How can society turn what a few people have learned, in a certain experimental space, into a collectively shared fact? Voss and Schrot (2018) highlight that, for effective transformation, there is a need for broad support, mobilisation of collective action and legitimisation (and empowerment).

I believe that biodistricts might offer the spaces where change is happening.

This chapter has been guided by the quest to explore what fosters and hinders successful transformations of food systems towards sustainability. Following along this, the rest of the thesis will try to answer the following questions:

1. How can territorial spaces of transformation be conceptualized?
2. To what extent can biodistricts become territorial spaces of transformation for food systems?
3. How do biodistricts evolve?
 - a. What is the role of territories in the emergence of biodistricts?
 - b. What is the observed impact of biodistricts on the transition of territories towards agroecology?

To conclude, it must be recognized that individual actions at firm or citizen level alone will not be sufficient to make sure sustainability transitions are happening successfully. On the other hand, the government alone cannot control the societal transformations needed, since, according to Burch et al. (2016), they are a complex set of multifaceted interactions between agency and structure. Therefore, no-one alone can make a sustainability transition happen, but all actors and stakeholders can influence the pace, direction and quality of the sustainability transition. They can do so through proper governance methods, making sure geographic characteristics are considered and evolutionary approaches are applied. Chapter 2 and 3 of this thesis will try to prove, through an empirical analysis, that biodistricts can be considered territorial spaces of transformation for food systems and that they have a true impact on the transitions of territories towards agroecology.

1.5. Materials and methods

The empirical research of this thesis has relied on the collection of data and information through different quali-quantitative methods:

- Conceptualization of territorial spaces of transformation (section 2.1 and 2.2): documents analysis and face-to-face interviews;
- Biodistricts as territorial spaces of transformation (section 2.3): questionnaire;
- Role of territories in the emergence of biodistricts (section 3.1): GIS analysis of territorial data;
- Impact of biodistricts on agroecological transition of territories (section 3.2): application of CAET-TAPE framework and face-to-face interviews.

Section 2.1 aims at bringing clarity to the different definitions of 2 rural districts, biodistricts, and biological districts, which all have defined and specific characteristics under Italian law. The data for the clarification have been gathered through desk research and public documents.

In chapter 2, section 2.2 I have analysed 8 biodistricts in Tuscany, which is the Italian region containing the highest number of biodistricts (8 out of ca. 40 biodistricts, already developed or currently being set up), (Figure 2).

Since the sources for the biological district definitions are different among the different regions and since, also within the same region, the biodistricts as associations are set up in a similar but diverse way (following either a formation process guided by AIAB, by a group of citizens, by consumers, or sometimes by the local guidance from an administration), it is natural to say that comparable exact data are hard to collect: objective quantitative analysis was therefore not straightforward and, for this reason, to gain an initial picture and idea on the experiences, qualitative information has been collected through case study research and semi-structured interviews.

Case study research has been used because it allows in-depth exploration and understanding of complex issues (Yin, 1994). The 8 biodistricts are, currently, the only biodistricts as associations in Tuscany and they provide plenty of qualitative information for our aim.

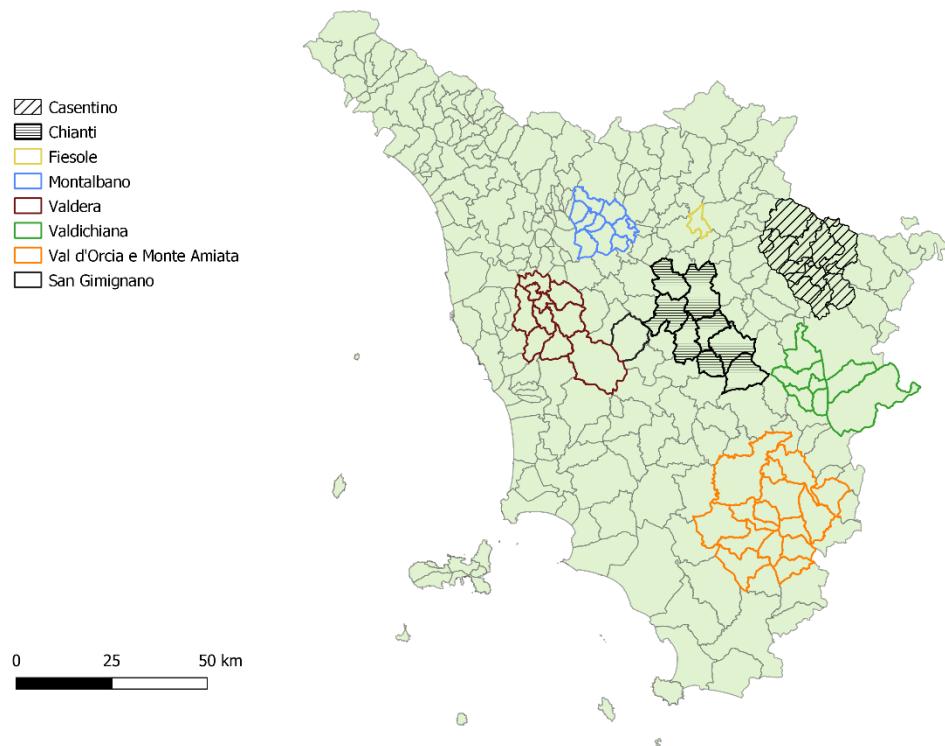


Figure 2: Biodistricts in Tuscany, with their administrative areas. Source: elaboration on QGIS using GoogleMaps and administrative files from Diva-GIS data.

These biodistricts have been nonetheless selected through a purposive sample procedure, a technique widely used in qualitative research for the identification and selection of information-rich cases and for the most effective use of limited resources (the covid-19 pandemic at the time of research has made mobility across different territories troublesome, and, given the residency of the researchers in Tuscany, the case selection has been more straightforward due to the geographical proximity of the biodistricts) (Patton, 2014). Also, purposive sampling has been used with the aim of focusing only on particular characteristics, enabling me to explain the key research question (Ritchie et al., 2013), i.e. to investigate whether biodistricts can be considered as meso-spaces for transformation of food systems at territorial level, to understand the processes and dynamics within these initiatives and, ultimately, understand if and how to improve, transfer and accelerate their implementation.

The data gathered for section 2.2 has relied on around 22 face-to face, in person interviews of the duration of ca. 45mins to 1 hour each. The interviews have been semi-structured, following along key themes: formation process and ideation of the biodistrict; understanding of actors involved and role of producers; interaction with administrations; social cohesion and territory; governance and decision-making processes; activities and general impact; strategy and institutionalization.

The interviews have been conducted in a semi-structured way, with open-ended questions and taking interview notes during the meetings. The interviews have been held with the 8 presidents

of the biodistricts, and, when possible, with selected producers (5 members of 5 biodistricts), citizens and consumers (6 members of 6 biodistricts), technical experts (2 agronomists), and local municipality representatives (1 mayor), and the interviews were conducted by the author of this research. Each interview has been conducted individually, during the period of May to September 2020. Descriptive notes have been written: the results in section 2.2 are based on a thorough analysis of these notes and through interpretative reflections. The data collected have been categorized along the key themes mentioned above.

The data collection and analysis has combined interviews with the study of relevant sources, like biodistricts' assembly reports, local municipality policy draft and/or completed regulations, socio-economic documents drafted by the biodistrict steering committees (e.g. Socio-economic territorial plans), all enriched with information from the biodistricts' websites, when available.

Therefore, both individual and contextual data have been collected: individual data have been collected through face-to-face interviews, also reflecting personal and interpretative perspectives; contextual data have been collected through desk research, using document and reports analysis, along with participant observation and participatory research (Reason and Bradbury, 2008; Chevalier and Buckles, 2013), when possible.

In section 2.3, data have been gathered through a cross-sectional survey. A questionnaire has been sent to the 23 active biodistricts in Italy to investigate the motivations for the creation of the biodistricts and to understand whether biodistricts can be considered meso-spaces of transformation at local level, therefore creating connections between grassroots actors and governmental actors, and creating spaces where the gap between the two levels can be closed. Out of 23 biodistricts, the questionnaire has been completed by 18 of them. In several cases (10 out of 18 replies), the completion of the questionnaire has been followed up by a phone interview with the representatives of the biodistricts, in order to clarify certain answers or peculiar aspects of the experience.

The 18 biodistricts, which have completed the questionnaire online, are so distributed:

- 8 in Northern Italy – Val di Vara, Val di Gresta, Colli Euganei, Trento, Canavese, Valle Camonica, BioVenezia, BioAltopiano Asiago;
- 4 in Central Italy - Distretto Biologico Umbro, Piceno, Via Amerina e Forre, Valle di Comino;
- 6 in Southern Italy - Cilento, Grecanico, Alto Tirreno Cosentino (Baticos), Valle del Simeto, Terre degli Elimi, Nebrodi

therefore with a good representation of the different territories across Italy.

The survey has been distributed through the online survey tool surveymokey³, through a self-administered questionnaire, with 10 closed-ended questions developed after careful consideration of the literature and through a selection of specific themes to be further analysed after the results of interviews in section 2.2.

In section 3.1 I have analysed some characteristics of the territories where the biodistricts are present. By giving a description of the local territory, I looked at measures such as the level of organic agriculture out of total cultivated land in a municipality, the level of soil consumption, the level of waste sorting, the level of urbanization, the number of associations in the territory (as a proxy of social activism), the levels of photovoltaic energy production. The data have been gathered through public websites and documents, and they have been analysed through GIS tools.

In section 3.2 I have applied the CAET-TAPE framework from FAO. The full framework can be found in detail in Annex B at the end of the thesis. It assesses the sustainability transition of a territory by analysing different agronomic and socio-economic topics of the farms and stakeholders within territory and by looking at:

1. Diversity
2. Synergies
3. Efficiency
4. Recycling
5. Resilience
6. Culture and Food Tradition
7. Co-creation and Sharing of Knowledge
8. Human and Social Values
9. Circular and Solidarity Economy
10. Responsible Governance

The 10 elements above are composed of different indices (3 or 4, depending on the element), and they are assessed via descriptive scales with scores from 0 to 4 (a modified Likert-type scale). As an example, the element “Efficiency” is composed of the following indices: (a) use of external inputs, (b) management of soil fertility, (c) management of pests and diseases, (d) productivity and household’s needs. The score ranges from 0 to 4, depending on efficient the farms are. The biodistrict is composed of several farms, which might have different levels of efficiency: percentages are assigned to each score, depending on the levels of efficiency of the biodistricts’ farmers. For example, index (a) use of external inputs, might have the following score:

³ <https://www.surveymonkey.com/>

Majority of input is purchased from the market (score 1 x 50% of the farms in the biodistrict)
AND majority of the inputs is produced on farm or exchanged with other members of the community (score 3 x 50% of the farms in the biodistrict) = total score 2, score of the biodistrict on use of external inputs.

The scores of the four indices are summed (e.g., $2+3+3+4=12$) and the totals are standardized on a scale from 0 to 100 percent ($12/16=75\%$): this allows us to have the general score for the element “Efficiency”. The same methodology is applied to the other 9 elements.

Table 1 shows an example of the descriptive scales and scores for the element of *Efficiency*.

The other 9 elements are following a similar rationale.

	Score	0	1	2	3	4
	Index					
Efficiency	Use of external inputs	All inputs are purchased from the market.	The majority of inputs is purchased from the market.	Some inputs are produced on farm/within the agroecosystem or exchanged with other members of the community.	The majority of the inputs is produced on farm/within the agroecosystem or exchanged with other members of the community.	All inputs are produced on farm/within the agroecosystem or exchanged with other members of the community.
	Management of soil fertility	Synthetic fertilisers are used regularly on all crops and/or grasslands (or no fertilisers are used for lack of access, but no other management system is used).	Synthetic fertilisers are used regularly on most crops and some organic practices (e.g., manure or compost) are applied to some crops and/or grasslands.	Synthetic fertilisers are used on a few specific crop only. Organic practices are applied to the other crops and/or grasslands.	Synthetic fertilisers are only used exceptionally. A variety of organic practices are the norm.	No synthetic fertilisers are used, soil fertility is managed only through a variety of organic practices.
	Management of pests and diseases	Chemical pesticides and drugs are used regularly for pest and diseases	Chemical pesticides and drugs are used for a specific crop/animal only. Some	Pests and diseases are managed through organic practices, but chemical	No chemical pesticides and drugs are used. Biological substances are the norm.	No chemical pesticides and drugs are used. Pests and diseases are managed through a

	management. No other management is used.	biological substances and organic practices are applied sporadically.	pesticides are used only in specific and very limited cases.		variety of biological substances and prevention measures.
Productivity and household's needs	Household's needs are not met for food nor for other essentials.	Production covers only household's needs for food. No surplus to generate income.	Production covers household's needs for food and surplus generates cash to buy essentials but does not allow savings.	Production covers household's needs for food and surplus generates cash to buy essentials and to have sporadic savings.	All household's needs are met both for food and for cash to buy all essentials needed and to have regular savings.

Table 1: Characterization of Agroecological Transitions (CAET) - Descriptive scales and scores for the element of “Efficiency”. Source: FAO (2019) TAPE Tool for Agroecology Performance Evaluation.

Once the general scores for each element has been calculated, each system has been represented in radar-type diagram for the biodistrict.

In order to give a general interpretation of the agroecological transition of the system, considering the advice from FAO (2019), an average of all the 10 elements has been calculated and this provides a basis to assess the agroecological transition of the biodistrict.

Still following on FAO (2019), I have used the below ranges to define the stage for agroecological transition:

- <50 %: non agroecological system;
- From 50% to 60%: system with incipient transition to agroecology;
- From 60% to 70%: system in advanced transition to agroecology;
- >70% advanced agroecological system.

For the correct application of the CAET-TAPE framework, the data collection and analysis has combined interviews with the study of relevant sources, like biodistricts' assembly reports, local municipality policy drafts and/or completed regulations, socio-economic documents drafted by the biodistrict steering committees (e.g., socio-economic territorial plans), all enriched with information from the biodistricts' websites, when available. Primary data was collected through 9 face-to-face semi-structured interviews conducted in late 2020 and the beginning of 2021 with the three presidents of the biodistricts (three individual interviews), three selected producers (members of the biodistricts – three individual interviews), three technical experts, members the biodistricts (three individual interviews). The interviews were conducted by the author of this research and lasted on average 45 minutes to 1 hour each.

The interviews have been conducted in a semi-structured way, along the questions proposed by the CAET-TAPE framework.

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2. Chapter 2 - Biodistricts as spaces for the sustainable transformation of food systems. Insights from 8 cases in Tuscany.

The aim of this chapter is to conceptualize further and understand the role of meso-spaces in food system transformation towards sustainability and to highlight the generic characteristics which make these spaces successful in fostering a process of change within territories. By analysing and disentangling biodistricts and their actors, governance rules, and dynamics within selected cases in Tuscany, I have the objective to better define what could really be meso-spaces and start to define which characteristics, ethnography, culture and social traits make some regions better candidates for impactful transitions of the food and, in general, economic systems. As previously mentioned, and as highlighted by Driessen et al. (2012), territorial spaces of transformation are spaces of governance, where civil society, citizens, and private firms might get together through different rules of governing, deliberation, and legitimization. In these spaces, the participation of institutions is optional but fundamental. Biodistricts, in this sense, represent in theory ideal meso-spaces for transformation, intended as regional spaces positioned between individuals, citizens and firms on the one hand, and institutions on the other.

It is therefore interesting to understand whether biodistricts represent an opportunity to be considered territorial meso-spaces for food transformation, where grassroots initiatives and bottom-up innovations are strengthened and spread to a wider audience and where institutions are working for acceptance of policies and norms through a work of informality and listening, by participating in open forums and discussions with the different actors from the territory. As put by Haasnoot et al. (2020) there is a need to create ‘solution spaces’ at territorial level, and biodistricts could represent these prevention and adaptation spaces where planning and action towards climate change happens, and where processes of replication and up-scaling of intelligent solutions for sustainable food systems find fertile soil to grow.

Since one of the criticisms of local sustainable initiatives is to usually be developed outside policy frameworks or in opposition of agri-food systems (Seyfang and Smith, 2007; Hossain, 2016; Smith et al., 2016), biodistricts could offer spaces where hybridization happens, and where local authorities, represented by municipalities and province governments, could blend with private actors to discuss, plan, and accept solutions for food system transformation.

This chapter aims, first, at clarifying the definition of biodistrict at regulatory level and at differentiating it from similar instruments of governance at local level. As a second objective, the chapter wants to identify the key characteristics of 8 biodistricts in Tuscany, Italy, and understand how these biodistricts act at local level when analysed as meso-spaces for transformation of food systems. Biodistricts are territories ‘naturally devoted to organic [farming], where farmers, citizens, public authorities, realize an agreement aimed at the sustainable management of local resources, based on the principles of organic farming and agroecology’ (as per the general definition of the International Network of Eco-Regions given in 2014), and there are currently 8 biodistricts in Tuscany, all with similar but diverse histories, formation processes, degree of involvement of the different actors, and future prospects. Little is known about the processes within these initiatives

and how effective they are, and, having the last years seen a surge in these initiatives especially in Italy, it is essential to understand their dynamics, and, ultimately, understand if and how to improve, transfer and accelerate their implementation.

The chapter identifies and analyses, within the biodistricts experiences in Tuscany, the formation processes, the actors involved, the role of producers, the relational network of the actors, the interaction of the biodistrict with the administrations, the governance methods, the general impact on the territory, the strategy for a potential institutionalization, and, finally, the role and potential of the biodistrict as a meso-space for transformation at territorial level.

Several semi-structured interviews have been conducted face-to-face with members of the biodistricts, technical advisers, administrations' representatives, and selected producers. The chapter overall has the objective to clarify the role of the biodistricts at territorial level, with the hypothesis that they offer the right spaces to go beyond some criticisms of local sustainable food initiatives, i.e. to be rather small and developed outside policy frameworks or in opposition to current agri-food systems. These experiences might favour the transformation towards sustainability, and, from the first results of the case studies, they seem to offer the right environment where autonomy of local initiatives is promoted, knowledge is shared among actors, and public local support is sustained, while still making sure that a wider audience is reached and that learnings are used for fruitful policymaking.

2.1. Rural districts, bio-districts, and biological districts.

The biodistrict is an example of a territorial, social and organizational innovation (Favillia et al., 2018) and could be defined as 'a geographical zone where farmers, citizens, tourist operators, associations and public actors sign an agreement (memorandum of understanding) for the sustainable management of local resources, based on organic principles and practices, aiming at the fulfilment of the economic and socio-cultural potential of the territory' (Basile and Cuoco, 2012). The definition of biodistrict, therefore, includes the bottom-up involvement of several actors, all operating in a specific territory, and the collaboration among all actors along the innovation processes and activities.

When talking about biodistricts, though, we can encounter some difficulties given by the general concept, and by the fact that biodistricts are organizational structures which can be either legally defined or just mere non-profit associations. From a regulatory point of view in the Italian context, biodistricts could be seen purely as agri-food districts, but, if we consider the district as per the definition of AIAB (Italian Association of Organic Agriculture - Associazione Italiana Agricoltura Biologica), the biodistrict is defined as a 'geographic area where farmers, citizens, tourism actors, associations and public administrations make a deal to manage sustainably local resources, starting from and promoting an organic mode of production and consumption'. Consequently, in this definition the economic aspect is as important as the social aspect, making it closer to a rural district than a mere agri-food district.

Before jumping into the analysis and interpretation of biodistricts as meso-spaces for transformation at territorial level, there is a necessity to look at the concept of rural district and

biodistricts (both as associations and as legal arrangements), through the history of the definitions and their development.

In the European context organic regions and organic districts are used interchangeably, while in the Italian context, due to the historical local systems of production, the terms “organic districts” (biological districts) are used more commonly (Truant, 2019). In Italy there is also a distinction between biodistricts (biodistretti), which are usually non-profit associations, and biological districts (distretti biologici), which are instead the legally recognized territorial arrangements. As we will see later in this section, at the moment there are only two legally recognized biological districts in Italy.

At European level, biodistricts as associations and biological districts are also called ‘organic districts’, or ‘organic regions’. In general, organic regions in the past have been supported by European grants, through the LEADER programme (an acronym in French: Liaison entre actions de développement de l'économie rurale – i.e. Links between actions for the development of the rural economy), a European Union initiative to engage local actors in the design and delivery of strategies, decision-making and resource allocation for the development of rural areas. The LEADER programme has the aim of stimulating innovation and job creation at local level and, through the PSR (Piani di Sviluppo Rurale – Rural Development Plans) of each EU member state, it tries to create revitalizing development plans for rural areas (Truant, 2019).

The concept of district has been developed and introduced by Marshall in 1919, having in mind the industrial activities: a district, in this context, was defined as a concentration of certain specialized industries in a certain area or region. Following on this, the Italian economist Becattini in 1990 has developed the concept further, by defining the industrial district as a socio-territorial entity characterized by the presence of a community of people and a number of firms and enterprises in a limited territory, which is culturally and historically defined. According to Becattini, the local community in an industrial district would support the local economic activities firstly through social relations, work ethics, reciprocity, secondly through the concept of family, schools and other associations, and lastly through local institutions. In this definition, the territory is recognized as a key influencing factor for economic activities within industrial districts and regions (Becattini, 1990; Romano, 2000).

Although some scholars (e.g. Iacoponi, 1990) have tried to analyse agricultural production regions in a similar way to industrial districts, it would be better to refer to the concept of rural district when talking about a territory where agricultural production is a key factor for the place (CREA, 2019).

The definition of district applied to the rural world, though, has been complex and lengthy. In fact, the first definition at legal level of industrial district was given in 1991, with the Italian law number 317/1991. Only in 1998 the government added the possibility for agri-food actors and tourism firms to participate in the negotiated programming within the district, along industrial firms (Adinolfi et al., 2010).

The first definition of rural district has been given in 2001, with the Italian law number 57/2001 defining it as a ‘local productive system characterized by a historical and territorial identity, deriving from agricultural and other local activities, and from the production of goods and services of a

certain nature and specificity. The activities of a rural district are coherent with the traditions and the natural vocations of the territory.'

The legislator, with the definition of rural districts, aimed at connecting agricultural development and production to important elements of the territorial, socio-economic and cultural capital, and, exactly for these peculiarities, it tried to promote the presence and implementation of rural districts across the territories (Sassi, 2009). Within the same law, we can also find the definition of agri-food systems of quality ('distretto agroalimentare di qualità'). According to the law, agri-food systems of quality are 'local productive systems, characterized by a certain presence of economic activities and by the interrelation and interdependence of agricultural and agri-food players, with the production of certified goods, or typical and traditional food products.'

Looking at this 2001 law, therefore, rural districts are born in and develop from a specific territory, which has its own identity and local culture: these are supporting the multifunctional valorisation of local activities, and permeate all business and social relations, typical of the rural district and not necessarily connected to a specific economic activity or to a specific production system. Specific economic activities and production systems are, on the opposite, key and central in the definition of the agri-food districts of quality, where the Law is trying to define and promote the development and consolidation of specialized food chains, which are connected to the agricultural world and are characterized by the production of typical products (Iacoponi, 2002; Sassi, 2009).

According to Sassi (2009) the agricultural territory has its roots way before the concept of industrial district (and therefore, the concept of a group of firms bundled around a specific economic and production activity), since a territory with a majority of agricultural activities, by nature, has always had a strong connection with the local community and society, and it has always been strongly influenced by the local culture, with an influence on both productivity and profitability of the operations (Nardone et al., 2005). At European level, there has been increasing interest in rural development policies and plans, as also highlighted by Iacoponi (1998), since the rural development has been seen as a solid alternative to unsustainable economic development: a sustainable rural economy has been seen as a solution to the global structural crisis of the economy, while also preserving the historical and environmental heritage of the territories where it develops.

Consequently, the concept of rural district, as already affirmed by Iacoponi (2002), is certainly more extended than the concept of agri-food district, and, for this reason, is the candidate of preference for placing biodistricts and biological districts.

The Italian Law, number 205/2017, has tried to disentangle the complexity between rural districts and agri-food districts, with scarce results. Starting from a definition of districts of food (distretti del cibo) as arrangements that, 'by promoting territorial development, social cohesion and inclusion, they favour integration of activities characterized by territorial proximity, they guarantee food security, they decrease environmental impacts of production, they decrease food waste and they safeguard the territory and the landscape through agricultural and food activities', the law also looks at biological districts by mentioning them as 'territories where organic farmers, processors, associations of consumers and local entities have agreed to diffuse organic methods of production,

and to value the sustainable management of all other activities connected to agriculture' (Italian Law 27.12.2017, nr. 205; CREA, 2019).

The legislator, therefore, by trying to simplify definitions, has brought more complexity to the picture: biological districts are never really, finally, defined in the national laws. In the Italian context, biological districts are mentioned on the side, in laws defining food districts ('distretti del cibo'), agri-food districts of quality ('distretti agroalimentari di qualità') and rural districts ('distretti rurali'), and always giving a definition which is a hybrid between all of them.

The difficulty and complexity, therefore, is that a definitive and homogenous definition in that law is not given and, in fact, the national law, although giving nuanced guidelines, leaves to each region the task to deal with the details and definition of what a biological district is. Toccaceli (2018) and Truant (2019) have also recognized that biological districts can be seen as a hybrid between rural districts and agri-food districts of quality. The following frame-definition for biological districts, which is included in a Law proposal, is currently under discussion (since 2018) in the Italian Parliament:

'local productive systems, with a strong agricultural vocation for 1) farming, breeding, transformation and food preparation of biological products; 2) organic production on the territory, touching several municipalities.'

At the moment though a final definition of biological district is still being drafted: for this reason, four Italian regions, Liguria, Lazio, Sardegna and Tuscany, have issued their specific regional laws defining the concept of biological district ((Liguria L.R. 66/2009; Sardinia L.R. 16/2014; Lazio L.R. 11/2019; Tuscany L.R. 51/2019)).

To summarize, in the Italian legislation we currently have three types of territorial arrangements:

- Districts of food (distretti del cibo);
- Agri-food districts of quality (distretti agroalimentari di qualità);
- Rural districts (distretti rurali).

The biodistricts as associations and the biological districts under specific regional laws, despite the several attempts by the Italian legislator to be more specific, are still falling within the more generic definition of rural districts.

In general, we have to say that the Italian legislator, as a general rule, has left to the regions the power to define the specifics of the different territorial arrangements, following the definitions of the national laws. For this reason, in the past years, several territories and regions have followed the definition of rural district, which, although having a defining national law, has also been specified in detail under regional laws. The different Italian regions have therefore defined rural districts with the specifics and the steps needed for a consortium of actors in a specific territory to be recognized as rural district.

If we take Tuscany, the region where we have had interviews with the different biodistricts, rural districts are defined under the Law 'LEGGE REGIONALE 5 aprile 2017, n. 17', where at Article 2 we find the that a territory can be defined as a rural district under the following conditions:

‘when there is a socio-economic system with:

- Agricultural production which is coherent with the natural vocations of the territory, and which is significant for the local economy;
- Homogenous historical identity;
- Consolidated integration between rural activities and all other activities;
- Production of goods or services with a certain specificity, and which are coherent with the traditions and natural vocations of the territory.’

In the absence of other relevant district definitions, some territories have decided to be recognized as rural districts. Following on this, and as mentioned before, four regions have decided to go forward with specific laws for the definition of biological districts. At the moment, though, it seems like only two biological districts have decided to be recognized under their respective regional laws, one in Liguria and one in Lazio (CREA, 2019). This means that out of more than 35 biodistricts in Italy, almost all of them are still purely associations.

If we take the specific regional laws giving a definition to biological districts, it seems coherent to bring here the definition given by Tuscany, which is home to the 8 bio-districts as associations which have been studied and analysed in section 4 of this chapter through face-to-face interviews. The Regione Toscana has issued the Regional Law 30.07.2019, number 51, which disciplines and details biological districts. Under this law, the biological district is defined as a territory

‘where there is a local productive system with a high agricultural vocation and in which there is the presence of:

- Cultivation, breeding/animal raising, transformation, preparation and commercialization of agricultural products which are the result of organic methodologies;
- Safeguarding of productions and cultural methodologies, breeding, local typical transformations, and the consolidated integration between the different agricultural activities with all other activities at local level;
- Attention to the characteristics of territorial and landscape identity of the local spaces;
- Respect of criteria of environmental sustainability, conservation and amelioration of agricultural soil and the protection of agro-biodiversity.’

We can here see that the definition of biological district under the Tuscan regional law starts from an initial framework given by the rural district, and it is then brought forward with additional focus on organic agriculture.

The territorial identity and specificities are similarly highlighted and equally important: the activities of a biological district, for it to so be defined, have to be rooted in the local territory and have to bring special attention to the environmental aspects. In the same law, there are also several objectives which the region is trying to achieve by promoting the definition and development of biological districts: among them, besides the guiding principles of promoting organic agriculture and protection of agro-biodiversity at local level, there are:

- 1) increase in dialogue and cooperation among local actors,
- 2) increase in participatory governance,
- 3) promotion of innovative processes for public food procurement,
- 4) increase of collective processes aimed at policy making and policy implementation,
- 5) promotion of local soils regeneration,
- 6) development and implementation of food education programmes, bridging farmers and consumers,
- 7) revalorization of the local territory to all actors, citizens, firms, and tourists.

It is also interesting to highlight that the regional law requires that the participating actors draft in the agreement of the biological district some concrete objectives for an economic integrated territorial project ('Progetto Economico Territoriale Integrato – PETI'), which should have specific socio-economic steps, valuing local resources, favouring sustainable development and organic production, safeguarding environmental, cultural and historical local traditions.

While at the moment in Tuscany we have no legally recognized biological district, we can see that the regional legislator has provided the base and structure for the biodistricts as associations to start the journey to become recognized.

The regional law offers interesting options to the associations. Apart from the opportunity to inform the regional parliament periodically about the initiatives brought forward by the biological district actors, the law gives a better structure for the actors to request regional financial funds, and, at the same time, it gives the option to maintain the biodistrict as association and also have a leading association or actor within the consortium which would be part of the biological district: this could be an incentive for biodistricts as associations to become the leading party within the consortium of actors, leading party which would then be the referent actor of choice towards the region. There could be a biodistrict acting as association rooted in the territory and as leading referent for the biological district, while in parallel the biological district would also be legally recognized under the regional law, with all its benefits (and potential controversies, as we are mentioning below briefly and in the following section).

We will go more in-depth into this theme in section four, given the fact that several biodistricts as associations, during the interviews, have voiced their concerns on being restricted in their actions if they had closer relationships to the Regional administrations and if they were falling under the definition given by the regional law.

Anticipating the law, national and international associations have given a definition to the concept of biodistricts already in 2009, when the first Italian biodistrict of Cilento was created, following the definition of AIAB (Associazione Italiana Agricoltura Biologica – Italian Association of Organic Agriculture): 'a geographic area where farmers, citizens, tourism actors, associations and public administrations make a deal to manage sustainably local resources, starting from and promoting an organic mode of production and consumption'. The approach proposed by AIAB tries to promote a territorial brand, and the association has developed guidelines for the biodistricts as associations to follow if they want to become an 'AIAB biodistrict', with the use of the AIAB logo. The biodistricts as associations which are following the AIAB structure formalize a sort of

agreement between farmers, citizens, touristic operators, associations. and public administrations, and they are trying to promote the territory and its specificities. Being AIAB an association of organic producers, technicians and citizens that primarily represents the interests of organic producers, we can say that the biodistricts that follow this model might have agricultural objectives before cultural and social ones.

In 2014 also a network of Eco-Regions was created: INNER, the International Network of Eco-regions was established in Rome, and it represents a coordination effort among the different biodistricts. The definition of biodistricts by INNER, which has among its members non-profit associations, citizens, and firms, is the following: ‘a territory naturally devoted to organic, where farmers, citizens, public authorities, realize an agreement aimed at the sustainable management of local resources, based on the principles of organic farming and agroecology.’

The definition of INNER, it seems, is deliberately nuanced and more generic, therefore being able to include all the different definitions given by regional laws and other associations. INNER, also, does not provide specific guidelines, but leaves to the different biodistricts to choose the desired reference definition and structure to follow.

Given the complexity of the picture, table 2 below tries to give an overview of the different concepts of districts at national and regional level, and also according to the different organic agriculture (Italian and international) associations.

	Overview of definitions, by legal or other* references (*national or international association)					
Territorial Arrangement	National Legislative Decree 228/2001	National Law nr. 205, 27.12.2017	Regional Law Tuscany nr. 17, 5.04.2017	Regional Law Tuscany nr. 51, 30.07.2019	INNER ⁴	AIAB ⁵
Agri-food district of quality (Distretto agroalimentare di qualità)	Local productive systems, characterized by a certain presence of economic activities and by the interrelation and interdependence of agricultural and agri-food players,					

⁴ INNER, International Network of Eco-regions

⁵ AIAB, Associazione Italiana per l’Agricoltura Biologica (Italian Association for Organic Agriculture)

	Overview of definitions, by legal or other* references (*national or international association)					
Territorial Arrangement	National Legislative Decree 228/2001	National Law nr. 205, 27.12.2017	Regional Law Tuscany nr. 17, 5.04.2017	Regional Law Tuscany nr. 51, 30.07.2019	INNER ⁴	ALAB ⁵
	with the production of certified goods, or typical and traditional food products.					
Rural district (Distretto rurale)	Local productive system characterized by a historical and territorial identity, deriving from agricultural and other local activities, and from the production of goods and services of a certain nature and specificity. The activities of a rural district are coherent with the traditions and the natural vocations of the territory.		When there is a socio-economic system with the following characteristics: 1) Agricultural production which is coherent with the natural vocations of the territory and which is significant for the local economy; 2) Homogenous historical identity; 3) Consolidated integration between rural activities and all other activities; 4) Production of goods or services with a certain specificity, and which are coherent with the traditions and natural vocations of the territory.			
District of food (Distretto del cibo)		Promoting territorial development, social cohesion and inclusion, they favour integration of activities characterized by territorial proximity, they guarantee food security, they				

	Overview of definitions, by legal or other* references (*national or international association)					
Territorial Arrangement	National Legislative Decree 228/2001	National Law nr. 205, 27.12.2017	Regional Law Tuscany nr. 17, 5.04.2017	Regional Law Tuscany nr. 51, 30.07.2019	INNER ⁴	ALAB ⁵
		decrease environmental impacts of production, they decrease food waste and they safeguard the territory and the landscape through agricultural and food activities.				
Biodistrict as association (Biodistretto)					Territories naturally devoted to organic [farming], where farmers, citizens, public authorities, realize an agreement aimed at the sustainable management of local resources, based on the principles of organic farming and agroecology.	Geographic area where farmers, citizens, tourism actors, associations and public administrations make a deal to manage sustainably local resources, starting from and promoting an organic mode of production and consumption.
Biological district legally recognized (Distretto biologico)				Local productive system with a high agricultural vocation and in which there is the presence of: 1) Cultivation, breeding/animal raising, transformation, preparation and commercialization of agricultural products which are the result of organic methodologies; 2) Safeguarding of productions and cultural methodologies, breeding, local typical transformations, and the		

	Overview of definitions, by legal or other* references (*national or international association)					
Territorial Arrangement	National Legislative Decree 228/2001	National Law nr. 205, 27.12.2017	Regional Law Tuscany nr. 17, 5.04.2017	Regional Law Tuscany nr. 51, 30.07.2019	INNER ⁴	AIAB ⁵
				consolidated integration between the different agricultural activities with all other activities at local level; 3) Attention to the characteristics of territorial and landscape identity of the local spaces; 4) Respect of criteria of environmental sustainability, conservation and amelioration of agricultural soil and the protection of agrobiodiversity.		

Table 2: Overview of definitions, following national and regional laws, and definitions from national and international associations. Adapted from: CREA, 2019; Toccaceli (2012); Franco and Pancino (2015).

Biodistricts as non-profit associations have been the first ones to be used when considering organic agriculture. Biodistricts as associations have been developed and implemented irrespectively of a specific law defining them: they have been set-up having in mind the definition from AIAB, modifying the concept and structure according to the specific characteristics of the territory where they were being set-up.

Truant (2019), integrating a report made by the Mediterranean Agronomic Institute of Bari (CHIEAM), has been able to catalogue the biodistricts according to the model used to promote the creation: out 6 biodistricts in Tuscany (the 7th biodistrict, Valdera, and the 8th, Val d'Orcia and Monte Amiata, have been created after the study and therefore have not been catalogued), 2 of them, Chianti and San Gimignano, have been created following the AIAB guidelines, while 4 (Casentino, Fiesole, Montalbano, Valdichiana Aretina) refer to the AIAB model but in a modified version which is characterized by a greater importance given to organic agriculture as a socio-economic development tool rather than just a production method.

The first biodistrict as association has been created in Cilento, in the South of Italy, in 2009. Since then, the number has increased rapidly, with currently more than 40 biodistricts in all of Italy, either in construction or already active. Organic agriculture in the first biodistricts has played a key role for the local development, with citizens, associations, farmers and local municipalities playing

an increasing role over time. In the more recent biodistricts, organic agriculture is still at the center of activities, but also pivotal to reach other objectives like environmental goals, sustainable economic development, and social objectives (e.g. increased social inclusion or improved land management).

Shreck et al. (2006) and Stagl (2002) have highlighted how organic agriculture can promote social, economic and environmental sustainability only when all firms and actors along the food chain at local level are involved, together with consumers and farmers. Community in the territory needs to be an active and engaged player for sustainable development, and all the initiatives need to be accompanied by processes of creation of a local identity, by stimulating participating and involving all components of the civil society (Pugliese, 2001). In general, Marsden and Smith (2005) and Seyfang (2006) highlight how organic food chains diffuse sustainable development values across territories, by fostering active local ecological citizenships among consumers, by promoting food sustainability knowledge and education.

The biodistrict as association is following these lines: it is an organizational model based on partnerships which mirror what can be already found in the local community. Biodistricts as associations, in theory, try to analyse and understand what the needs of local communities are, and with meetings and forums open to the general public, aim at developing a network of relations between public and private actors (Toccaceli, 2015). The biodistricts as associations, therefore, aim at going over the usual bottom-up models which have always been used and try to structure new forms of governance where all components of society are involved (CREA, 2019).

It is here also important to highlight that first comparative research projects have been done by some scholars (Pacciani and Toccaceli 2014; Toccaceli 2014), which have looked into case studies in Belgium, Spain, and France. Looking at territorial arrangements developed to manage rural governance, they have found consistent similarities with the French ‘*contrat de Pays*’ (Toccaceli, 2012) and the functioning of the ‘*collectivités territoriales*’ (Le Lidec, 2007). Fernández Moral (2014) have also found similarities between the biodistrict structure in Italy when compared with LEADER-based activities in Spain.

Stotten et al. (2017) has analysed the role of biodistricts as associations in the local development process and she has highlighted the fact that organic agriculture and sustainable development have several points in common. Involving a wide variety of actors and activities, in fact, also organic agriculture has ramifications at horizontal and vertical level in the local region, touching several other sectors and influencing human, technical, social and natural elements and networks. Biodistricts as associations therefore rest their base both on agricultural production and social aspects (Clemente et al., 2013).

By exploiting the high presence of organic farming in a certain territory, and with the aim of increasing the organic lands and farming in the region, biodistricts as association could also make sure that environmental health and sustainability are well-placed within the socio-economic development of a specific region. Therefore, by implementing an integrated way to tackle social and environmental issues, biodistricts as associations are also potentially increasing the role and autonomy of the local community, through bottom-up governance modes.

The next section will discuss exactly these themes, by investigating whether biodistricts in Tuscany have acted and are acting as meso-spaces for transformation of food systems and territorial development.

2.2. Meso-spaces at territorial level: the case of 8 biodistricts in Tuscany.

The interviews have been guided by a macro structure looking at the role of actors, territorial background, and governance, and inquired about:

- Formation process and ideation: since sometimes organic regions present at European level seem to have among the key primary objective the increase in market share of the organic food sector rather than the contribution to the overall territorial development (Truant, 2019), the aim was to analyse the formation process and motivations behind the structuring of the 8 biodistricts;
- Actors involved and role of producers: understand the type of actors present within the biodistrict association, e.g. associations, citizens, consumers, farmers or other production firms, administrations' representatives, and investigate the type of farmers present (organic or not) and their degree of involvement in the activities;
- Interaction with administrations: highlight the formal and/or informal interaction with the local municipality representatives;
- Social cohesion and territory: investigate the functioning of the community and the interpersonal relationships with the territory. Try to highlight the presence of a shared sense of identity, shared value, and a shared understanding of the aim of the biodistrict (both internally and externally). Is a common purpose present?
- Governance: investigate the decision-making processes, governance methods, governing bodies, and in general inquire about formal and informal governance;
- Activities and general impact: what do interviewees believe has been the impact of the biodistrict activities on the territory?
- Strategy and institutionalization: general strategy for the association, informal institutionalization, and willingness to formally become institutionalized;

Overall, the authors aimed at reaching a first partial conclusion on what is the role and potential of biodistricts as meso-spaces for transformation of food systems at territorial level. The interviews took place either in the farm or production field of the presidents and other members (usually farmers) of the biodistricts, or, on one occasion, in the office of a local mayor.

Formation and ideation – the biodistricts in Tuscany are generally of recent formation. Biodistretto del Chianti and Biodistretto di San Gimignano were the first to be set up, in 2012, while Biodistretto Valdera, with the first meetings between actors held in early 2020, is the most recent. Investigating the formation and ideation processes in the early stages of each biodistrict has allowed us to disentangle and understand the motivations behind the development of the biodistricts. In most of the cases (Chianti, Casentino, Val d'Orcia, Valdera, San Gimignano) the biodistrict was initiated with a strong push from the local organic producers, with the aim of gathering the local farms to promote sustainable development and agriculture. In two of these

cases, Chianti and San Gimignano, there was a relevant push from the local delegation of the AIAB association. In Montalbano, the consumers and citizens instead were the driving force behind the development of the biodistrict: the local Solidarity Purchase Group (SPG) contacted the farmers of the SPG network promoting the idea. In the case of Fiesole, there was on the other hand a strong push from the local administration. The reasons for the creation of the biodistricts vary: from getting together, to combat a chemical solution prescribed by law (Chianti), to the willingness of promoting sustainable development (Casentino, Fiesole, San Gimignano, Valdera), or also sometimes due to the initiative of a single agronomist (Val d'Orcia and Monte Amiata).

Actors involved and role of producers – The actors involved are varied: some biodistricts (e.g. Chianti) have a prevalence of producers, while others (e.g. Montalbano) have a majority of associations, citizens and consumers within their members (in the case of Montalbano: 90 non-farmers out of 150 total members). In general, all the biodistricts try to involve the majority of organic producers at local level. Sometimes local SPGs, when present, are active members of the biodistrict activities. Overall, biodistricts try to also involve tourism associations, craftsmanship activities, local social associations. The involvement of the local administrations varies by biodistrict (see below). Producers are always organic or in transition to organic agriculture, with the special case of Casentino, where also non-certified organic producers participate to the activities, when they accept to undergo inspections carried through a Participatory Guarantee System (PGS)⁶. Although, in general, a high number of members is composed by wine and oil producers in almost all the biodistricts (also considering the specialized agricultural production in Tuscany), there is still a large part of member producers of vegetables, fruit, grains, honey, and other products.

Interaction with administrations – Some biodistricts have decided to involve the administrations from the start (e.g. Valdera, and Montalbano with the municipality of Carmignano), by inviting them to the periodic assembly meetings and discussion forums, while others have decided to just keep the municipalities informed on the activities done by the biodistrict, without direct involvement. Some biodistricts (e.g. Casentino) decided not to involve the administrations from the beginning. While in general biodistricts stretch over a territory with around 5 to 9 municipalities, some interact with just one administration, while, on the other extreme, Val d'Orcia and Monte Amiata stretches over 15 municipalities. In some cases (Fiesole and Montalbano) some administration's representatives are also formal members of the biodistrict.

⁶ According to IFOAM - International Federation of Organic Agriculture Movements, a PGS is a “locally focused quality assurance systems. They certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks and knowledge exchange.”

Social cohesion and territory – The interviewees have highlighted how, among the participants in the biodistrict, there is a strong sense of identity and shared values. The promotion of organic agriculture and sustainable development, the implementation of more sustainable food systems and shorter food chains, are usually brought as key elements which are uniting the members of the biodistrict around a common cause. In some biodistricts (e.g. Casentino or Chianti), the interviewees pointed out how a stronger involvement of actors other than the producers would be highly welcome. In one case (Montalbano), the interviewees pointed out how the presence in the territory of a strong social activism and historical local associations active in the voluntary social works provided a solid base for the formation and development of the biodistrict: the shared identity and sense of belonging to the aim of the biodistrict, i.e. to foster organic agriculture and sustainable development at local level, were soon formed within the members of the biodistrict, and influenced the whole territory in having a positive and constructive attitude towards the activities of the biodistrict. The interviewees also stated how the participation in the periodic meetings and assemblies was very high, with participants coming from all over the territory.

Governance – All biodistricts have a similar governance structure. There is an assembly, which meets periodically and is composed of all members (which can go from 40 to 160, depending on the biodistrict). The members can be organically certified producers (or participating in PGS), citizens, local social associations, consumers, administrations (participating with some representatives). In some cases (when we exclude PGS participants), also non-certified producers are allowed, as long as they are producing without using chemicals (but the interviewees did not specify how they are checking this): in this case these producers do not have voting rights. All members, apart from the case just mentioned, have one voting right in the assembly. It is important to highlight that the assemblies are open also to non-members, which can participate as interested audience. The assembly usually approves or asks for modifications to the strategic plan of a Steering Committee, which is composed of 7 to 13 members, depending on the size of the Biodistretto. The Steering Committee usually decides on topics like energy, agriculture, events, and can be composed of producers and or technical experts. Also, almost all biodistricts have a President, Vice-president, and a treasurer/secretary. All roles are voluntary (non-paid), ratified by the general assembly, and periodically changed. Decisions are taken by majority in most cases, even though some interviewees made clear that quite often there is a wide consensus on the decisions, with very few people critically against the decisions taken.

Activities and general impact – Activities of the biodistricts have been varied and plentiful along their years of operation. If we exclude the Biodistretto of Valdichiana Aretina, which has been dormant in the last couple of years, the others have all in a way or the other been active in their territories. Several aims have been listed by the interviewees when explaining the activities organized by the biodistrict: to create a space of knowledge sharing for the organic producers and to promote organic agriculture and sustainable practices among them, by organizing visits to the different farms, or by organizing seminars with technical themes discussed by experts and among the group; to educate the local population towards sustainable food consumption, by organizing seminars, farmers' markets and convivial events with local products; to promote biodiversity and sustainable land use, by drafting reports and documents to be shared with local producers and administrations; to influence local administrations, by advertising all the above mentioned

activities, inviting the municipalities' representatives to the events, and trying to have a say with an expert opinion on the drafting of local policies for the socio-economic development of the territories.

It is here important to mention the case of Montalbano, which has been able to 1) collaborate with the municipality of Carmignano at local level, to set up a Green Support Office, offering free consultations for all local farmers on agronomical issues, with the aim of providing organic solutions; 2) collaborate with the mayor for the drafting of the first approved municipal law⁷ in Tuscany which bans the use of herbicides in certain circumstances in the municipal territory, providing a benchmark for other municipalities to follow.

The general impact, therefore, changes among the different biodistricts: in some cases the interviewees were satisfied with the results (e.g. Montalbano and Valdera), either because of the impactful activities and the wide reach, or because of the good initial steps undertaken to involve all important actors; in other cases, the interviewees have listed a series of activities to work on to either involve more producers, more consumers or get in touch with the local administrations to have a wider impact at local level. The interviewees have highlighted that, in general, there has been an increase of organic producers becoming members since the start of the biodistrict association, with very few cases of members deciding to leave the association (in these cases, the interviewees have mentioned personal reasons of the producers as motivations for leaving).

Strategy and institutionalization – The histories of the different biodistricts make their strategy for the future and their willingness to start the institutionalization process (i.e. forming a biological district under the Regional Law of Tuscany LR 51/2019, where they would be, likely, the referee of the consortium of actors) very diverse. All the interviewed biodistricts have the objective of increasing the organic production of the territory, educating the consumers and citizens towards a more sustainable food consumption, sharing knowledge of agricultural tools and methods which are preserving biodiversity and the traditional seeds at local level, and some of them have already reached some important results (e.g. Montalbano collaborating with the local mayor). Almost all of the interviewees though highlighted how they would like to reach a wider impact at local level: either through the involvement of a higher number of citizens and consumers (e.g. Chianti), through the participation to the periodical biodistrict assemblies, or through the reconnection eventually with the local administrations (e.g. Casentino and San Gimignano), for a common planning for sustainable development actions and policies. Most importantly, some biodistricts

⁷ Municipal Decree N. 8 of 29/01/2019. Temporary prohibition on the use of herbicides containing Glifosate on the whole municipality of Carmignano until 31st December 2019, to safeguard public health, drinking water sources and soil.

have been able to reach a higher status at local level over the years, thanks to their actions and activities. In the words of the interviewees, for example, Biodistretto del Montalbano has become an “informal institution”, being seen as the go-to association, both in the eyes of the municipalities and the farmers, citizens and consumers: several actors from the territory see the Biodistretto del Montalbano as a source of knowledge about organic agriculture and sustainable development, representation of the small-medium farmers, consultation for local development. Other biodistricts are also recognized at local level by the administrations as a subject-matter expert on organic agriculture, like for example Biodistretto del Chianti. In terms of formal institutionalization through the Regional Law LR 51/2019, at the moment Biodistretto del Chianti, Biodistretto di Fiesole and Biodistretto Montalbano are the ones moving forward with the different documents required for the application: they are all, indeed, working on an PIT (Integrated Territorial Plan) to be presented to the regional parliament, and they are drafting the strategic plans and activities needed to move ahead (e.g. actions to increase the size of organic land cultivated in the territory of the biological district, mandated by the law). Also Biodistretto Val d’Orcia and Monte Amiata is moving towards becoming institutionalized, but here the size of the territory (spanning 15 municipalities) and the low frequency of meetings among the members (only 1 assembly in the last year), make it an unlikely candidate to reach a fast decision soon. For Chianti, Montalbano and Fiesole the institutionalization process seems like a natural step, solidifying the years of activity in the territory, and making it easier to access funds and to develop a strong line of communication with the local administrations. In all cases, the biodistricts have highlighted how they would like to keep the biodistrict as association, to be the referee organization in the consortium leading the legally recognized biological district. The other biodistricts are still discussing on the opportunity of institutionalization: two of them are either currently inactive (Valdichiana), or too young (Valdera); the other two are still discussing internally on the benefits of having, in parallel to the association, also a more formalized and structured institution recognized by law (Casentino and San Gimignano).

	Casentino	Chianti	Fiesole	Montalbano	San Gimignano	Valdera	Valdichiana Aretina	Val d’Orcia e Monte Amiata
Year of establishment	2014	2012	2016	2015	2012	2020	2016	2018
Nr. of municipalities touched by the association	12	7	1	10	1	10	8	15
Legally recognized under regional law	No	No	No	No	No	No	No	No
Rural district present	No	Yes, and strong connection	Yes, weak connection	No	No	No	Yes, weak connection	No
Driving actors for formation	Producers	Producers	Administration and producers	SPG/citizens	Producers	Producers	Producers	Producers and technical expert

	Casentino	Chianti	Fiesole	Montalbano	San Gimignano	Valdera	Valdichiana Aretina	Val d'Orcia e Monte Amiata
Nr. of organic producers as members	20 (14 certified, 6 PGS)	55	25	60	40	50	10	50
Interactions with administrations	Not involved	Involved as party of interest (informed)	Involved as key driver	Involved as key driver along the way	Involved from the start	Involved from the start	Involved as party of interest (informed)	Not involved
Involvement of local consumers' associations, local associations, and citizens	- SPG - citizens	No formal participation of SPG, local associations and citizens	- citizens - local associations	- SPG - local associations	- Small number of citizens and limited participation from associations	- SPG - Local associations	- Some local associations	- Some local associations
Aim behind initial formation	- Access to regional funds (unsuccessfully) - Unite producers and increase organic production - Sustainable development - Sharing of information	- Fight chemical solution mandatory law - Unite organic producers	- Deal with healthy diets - Increase organic production - Improve local sustainable development	- Connecting consumers to producers - Create an alternative to a nearby polluted area - Create a strong group of actors dealing with sustainability	- Sustainable development of the territory - Define ecological goals to reach - Build short food supply chain	- Gather organic farmers - Promote sustainable development and agriculture - Create a bioregion - Influence local policies	- Gather organic producers - Influence local policies for banning use of pesticides	- Preserve biodiversity - Promote territory
Activities	- Participatory guarantee system - Convivial events with local associations and citizens - Seminars - Organization of farmers market	- Technical meetings on plants' diseases - Training courses (e.g. apiculture) - events and dinners - No pesticides campaigns - Collaboration with Italian and European research institutions	- Seminars on biodiversity - Events with local and national associations, e.g. Slow Food - Organizations of festival to promote and preserve traditions and knowledge in agriculture and craftsmanship	- Events and meetings, involving academic partners and representative from administrations - Creation of Green Office (offering agronomical consultation) - Consultation for no-herbicide draft - Creation of Plant Atlas, i.e. atlas of specific culture and seeds at local level	- Organization of farmers' market - Organization of environmental festival - Environmental campaigns and no-herbicides campaigns	- Collaboration with SPG for sharing food storage and distribution centre - Events and meetings with agronomists and environmental experts - Continuous meetings with local institutions	- Participation to no-herbicide campaigns - Small number of activities in the last two years	- Trainings and courses - Seminars

Table 3: the key characteristics of the biodistricts in Tuscany. Source: own elaboration based on the interviews.

2.3. Biodistricts as meso-spaces of transformation and motivations behind their creation. Further investigation on Italian biodistricts.

The questionnaire, composed of 10 questions (which can be found in detail in Annex A at the end of the chapter), had a mix of single choice (questions 4, 5, 6, 7) and multiple selection answers (questions 1,2,3, 8, 9, 10). The questions have touched upon the following topics:

1. Motivations for the creation of the biodistrict;
2. Initiators of the initiative;
3. Key actors along the years of activity;
4. Participation and share of organic producers;
5. Participation of the local associations and consumers;
6. Interactions with the local administrations;
7. Governance and assemblies;
8. Characteristics of the local territory;
9. Impact of the biodistrict on the territory;
10. Characterization of the biodistrict and future prospects.

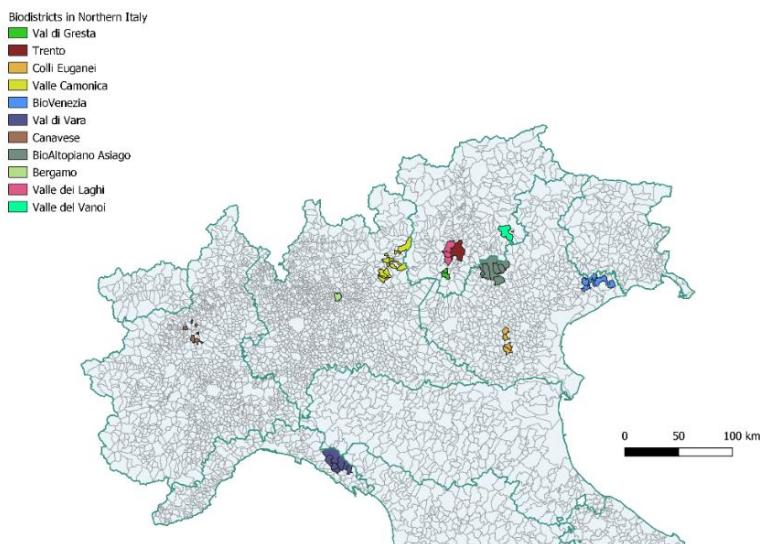


Figure 4: Biodistricts in Northern Italy.

An analysis of the answers to the questionnaire gives us an interesting picture on the activities of the biodistricts in Italy in 2020. Table 4 later in the section shows the summary of the answers from the 18 respondents.

In general, it is interesting to see how the majority of the biodistricts are set up in rural areas, or in the outskirts of the cities and urbanized areas. Of all the biodistricts in Italy, Trento and Bergamo are the exceptions: in these cases, there are two urban biodistricts which aim at creating a space of peri-urban dialogue, making sure that the interconnection between the urban citizens and the country-side dwellers is well established. Trento is part of the respondents to the questionnaire, and, as I will develop later in this section, it aims at establishing a link between the members of the biodistrict (consumers, citizens, organic producers, local associations) and the administrations for urban planning and sustainable food systems' strategy.

Motivations for the creation of the biodistrict (Question 1): the promotion of sustainable development and the safeguarding of sustainable themes in general has been listed as the major motivation for the creation of 17 biodistricts out of 18, along with the promotion of organic agriculture (16 replies) and the shortening of the food chain, in order to close the gap between

consumers, producers and institutions (13). The creation of the biodistrict to access financing tools supplied by the Region or the European Institutions has only been selected by 4 respondents, making this motivation the least selected.

This finding is also supported by other studies (Triantafyllidis et al., 2017), which highlight how the majority of the funds for the initial activities of the biodistricts and their associates are financed through self-financing and membership fees. Self-financing in this case is key in the initial years, but it is clear how, as also highlighted by some biodistricts in the interviews, in order to step up operations along the years of activity, financing sources need to be looked for outside the community of members. This additional financial step, according to the interviewees, would allow for the biodistrict to get a proper structure, with a solid base of personnel and representation.

Initiators (Q.2): the key actors, active in the beginning of the experience, have usually been the organic producers (11), and almost equally the local administrations (9). The level of involvement of the local administrations for the creation of the biodistricts has not been specified but, as confirmed in some interviews, in some cases it has given the necessary support for the community to start the experience.

AIAB⁸ has been involved in the creation of 10 biodistricts, 7 with direct involvement and 3 with support and equal involvement as other actors at local level. It has been the key initiator for the creation of 7 biodistricts (BioAltopiano Asiago, Colli Euganei, Grecanico, Terre degli Elimi, Valle del Simeto, Baticos, Val di Vara), thanks also to the promotion, within the association, of certain guidelines for the formation of biodistricts in the territory and thanks to the active role of the association within certain territories.

The approach proposed by AIAB⁹ for the creation of a biodistrict is following specific rules and procedures. The biodistricts which want to use the AIAB logo need to follow these regulations: the presence of all the local actors is key for AIAB to accept the biodistrict as an AIAB biodistrict. For this reason, producers and consumers need to collaborate between them but also involve the local administrations' representatives and tourist operators. The AIAB model is aiming at the promotion of the local territory as a brand, and it is giving, at least in the initial stages, slightly more attention to the organic production (when compared to other biodistricts which have more extended objectives at the initial stages), although not forgetting sustainable development in general.

In practice though, the AIAB biodistricts in the questionnaire are generally struggling to involve civic actors (other than administrations): in fact, they have stated how they have found difficulties

⁸ Associazione italiana per l'agricoltura biologica – Italian association for organic agriculture.

⁹ <https://aiab.it/biodistretti/>

in having a wide representation of the local territory, when considering citizens and local associations. This might be due to different reasons, among which the fact that AIAB is mainly representative of the production side of organic agriculture, although it aims also to involve the so-called “consumer-citizens”. In general, all 7 biodistricts have therefore high representation percentage of the organic producers but very low involvement of other local civic actors. A different situation can be seen in the interaction with local administrations: the AIAB biodistricts are all having strong relations with the local administrations (since, as previously mentioned, they have to involve all actors by following the AIAB approach): the 7 biodistricts have highlighted how they have a constructive and continuous dialogue with the local administrations, and in 4 cases (Asiago, Simeto, Baticos, Val di Vara) there have been concrete legislative actions. This is quite impressive, given the fact that the AIAB biodistricts in the questionnaire represent ca. 40% of the biodistricts, but 60% of the biodistricts which have been able to achieve legislative results (out of 7; the 3 additional biodistricts are taken into consideration in the specific paragraph later in the section). The good cooperation of these biodistricts with local institutions might be explained by the fact that AIAB is a well-established organization with offices in the territories across Italy, and it might offer a structured and non-partisan approach to dialoguing with the administrations’ representatives.

It is also interesting to notice that the AIAB biodistricts’ assemblies are in general strongly participated by the local producers (assemblies and governance, Q.7). In fact, of the 7 biodistricts which see a strong participation to the assemblies, 4 are AIAB’s: Baticos, Colli Euganei, Terre degli Elimi, BioAltopiano. This might reinforce the previous statement that, thanks to an already well-established and structured organization, the biodistrict’s activities might rest on a solid base and the organic producers might already be used to active local participation for sustainable development and promotion of organic agriculture.

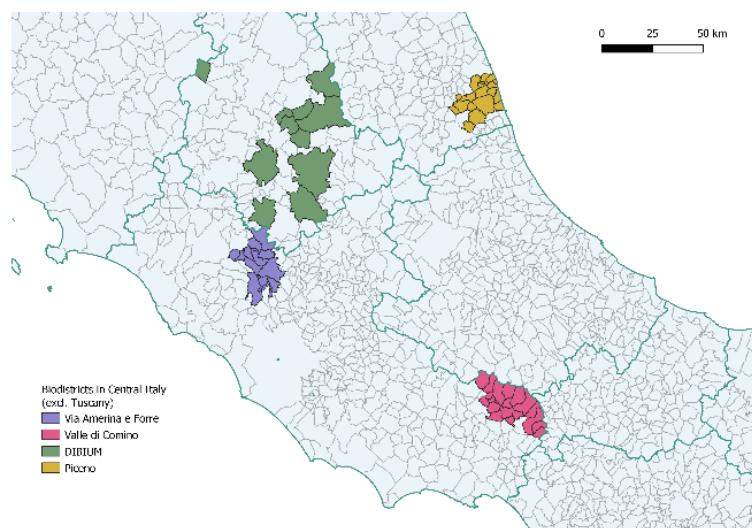


Figure 5: Biodistricts in Central Italy (excluding Tuscany).

In 3 cases (Val di Gresta, BioVenezia, and Filo di Luce in Canavese) AIAB has been among the initiators, but it has been joined with equal or sometimes more important roles by local administrations (Val di Gresta and BioVenezia), or local associations (e.g., the local Solidarity Purchase Group - SPG, in the case of Filo di Luce).

In two cases, out of 18, the initiative has been initiated by a single inspired entrepreneur at local level: this, though, has been paired with a certain difficulty in involving the necessary actors along the way and, most importantly, has been flanked by a lack of constant participation by the local associates to the activities along the years. Only in 3 cases the citizens of the local territory have been part of the initial steps of the biodistricts creation.

Most active actors today (Q.3); participation of organic producers, local associations and consumer groups (Q.4 and Q.5): along the years of activity, the organic producers (15) have been the most involved: this has been especially the case for the biodistricts where AIAB has been among the creators. It is interesting to note how the participation of the organic producers have improved along the years when the number of biodistricts is taken into consideration, but it is also worthwhile to notice that, although 10 respondents have stated that the biodistrict represent a high share of organic producers in the territory, their participation to the activities organized is somehow medium-low. With the static presence and participation of the organic producers, the participation of local associations and consumers has seen on the other side a slight improvement along the years.

Although citizens and local associations have collaborated with the biodistricts, in 13 cases the level of effort and energy put in the activities by these actors has been inconstant and variable. Only in 5 cases the respondents have stated the high and constant level of participation of the local community as a strength for the biodistrict.

Interactions with local administrations (Q.6): The interactions with the local administrations are generally positive, although with different degrees. Only in 1 case (Valle di Comino), out of 17, it has been stated that the interaction with the local administration is non-existent. In all the other cases, the dialogue is constant and in 6 biodistricts the representatives signalled that the discussions brought to concrete initiatives at municipal level and, in some cases, also to legislative actions.

One biodistrict highlighted the fact that, out of the 13 municipalities which are under the biodistrict, some of them are also members of the Steering Committee, therefore being able to influence the decisions of the association in a more direct way. At the general assemblies, the topics seem to find a general consensus: 15 respondents said that, although with varying degrees of participation, the members of the assemblies find themselves in accordance with the way forward for the biodistricts. In 2 cases, though, the respondents stated how the assemblies find little participation and high degree of dissent: this happens coincidentally, but unsurprisingly, with a very low representation of the companies in the territory and a very low participation to the activities of the social fabric of the local systems. In these two cases, it seems that the biodistrict still have some work left to do to properly involve the local actors.

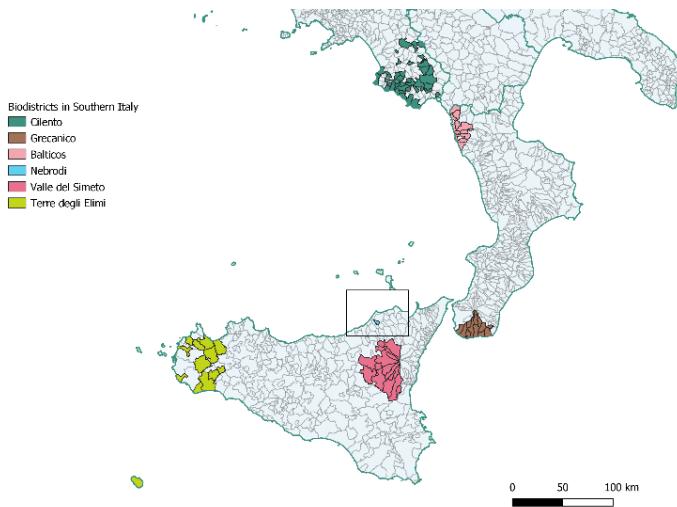


Figure 6: Biodistricts in Southern Italy.

Characteristics of the territory (Q.8): When it comes to the specific characteristics of the local territories which, according to the respondents, might have favoured the creation of the biodistrict, the strong presence of organic agriculture (12) is selected equally (12 – multiple choice answer)

together with the strong sense of the community for the promotion and safeguarding of biodiversity and the ecological aspects: this is often seen as a response to the industrialization and conventional agriculture happening either in the same territories or in neighbouring municipalities.

In 5 cases, the strong support from the local administration has been highlighted as a defining factor for the creation and subsequent success of the biodistrict's activities. The continuous support from the administrations seems to be quite relevant especially when it comes to legislative/normative results at local level: with 5 biodistricts having highlighted the support from the local municipalities, 5 also noticed how the dialogue with the institutions has brought to concrete legislative acts and experiences.

Impact of activities of the biodistrict on the territory (Q.9): The biodistricts in general (13 answers) are seen as places where sustainable practices can be shared between the organic producers, but they are also, according to the respondents, creating many more occasions where demand and supply for local organic products can match (10 respondents). Moreover, biodistricts seem to have

impacts at local level which go over the mere increase of organic agriculture (7). In fact, an increase in social cohesion and sense of community around sustainable themes (9) are signalled as an important factor characterizing the impact of biodistricts, together with a better education and food consciousness of local consumers.

As also mentioned before, legislative concrete actions by the local institutions are not easy results. In the case of Trento, for example, the interviewee highlighted how, although the dialogue with the city administration is constant, it is much easier to collaborate on some projects, rather than passing direct concrete legislative acts: the biodistrict has co-organized, together with the city administration, a project on monitoring and preserving the local biodiversity, especially in areas which are in-between urban and agricultural; the interviewee made clear how this setting is much easier, since, although the administration is an interested party, leaves much more room of action to the biodistrict. The legislative acts are an end-goal, which need to go through some 'experimenting' before. Therefore, the collaboration with the administrations seems to start with small, well planned actions, with the aim of reaching engagement and empowerment at local level, and with concrete legislative acts developed at a later stage, when the topics at hand are somehow already solidified and accepted (for what is possible) in the community.

Characterization of the biodistrict and future prospects (Q.10): The majority of biodistricts (13) have the objective of creating a space where producers, citizens, consumers, and institutions can start a dialogue about, plan for and find concrete solutions for the sustainability of the local food systems. Secondary objectives are the shortening of the local food chain, increasing the consumption of organic products (8) and the promotion of the territory, with a focus on responsible tourism (10).

It is interesting to highlight that in the 3 cases where respondents have selected that the biodistrict is purely an association promoting organic, they have always also selected additional answers: the aim of creating a meso-space for discussion between the different actors at local level. This can be explained by the fact that some biodistricts (e.g. biodistretto di Trento) have been initially created as a lobbying association representing organic producers but it has transformed into something bigger and more meaningful at local level, therefore aiming at transforming the whole local food system and at creating a governance space for dialogues between private companies, civic actors and local institutions. This seems to be in line with the overall trend in the questionnaire, and it also seems to be in line with the interpretation I have given to the biodistrict along this research, as a governance space and meso-space for transformation.

In 8 cases, the biodistricts have stated they would like to bring the journey of the association forward, by making it recognized at regional legislative level (see also chapter 2 of this research). In 7 of these 8 cases (Val di Vara, Via Amerina e delle Forre, BioAltopiano, Terre degli Elimi, Val di Gresta, BioVenezia, and Filo di Luce in Canavese) the biodistricts have been developed with the support of AIAB (either directly or indirectly - see before): this seems to be in line with the objectives of the AIAB association, which is supporting local communities in the set-up of biodistricts which have strong or in order to have stronger connections with local administrations. It seems a natural step, therefore, to aim at the legislative recognition and the formalization of the

role of the biodistrict, i.e., an institutionalization at territorial and regional level. This would cement the activities of the biodistricts and their role at local level.

In 2 cases, Via Amerina e delle Forre and Val di Vara, the biodistrict is already recognized at regional level, thanks to the respective regional laws: regional law¹⁰ of Lazio, approved in 2019 and the regional law¹¹ of Liguria, approved already in 2009. The two cases have peculiarities of their own. In fact, Valle Amerina e delle Forre highlighted how the actors of the biodistrict have also been involved for consultation in the drafting of the law, therefore showing how in this case the collaboration has been with different institutional levels. Val di Vara has highlighted on the other side how the biodistrict has been created following the provisions of the law, which dictates a majority of organic producers (which constitutes in this case more than 90% of the members of the biodistrict): on the downside, this has brought a low level of members from the civil society, consumer groups and associations, which now the biodistrict is trying to increasingly involve.

During an interview with the president of the biodistrict of Trento, it has been highlighted that the local community is now aiming at transforming the whole province of Trento (which makes half of the Northern region of Trentino Alto Adige) in the first sub-regional biodistrict, uniting the 4 biodistricts already present: Trento, Valle dei Laghi, Vanoi and Val di Gresta. There is a referendum scheduled to be held in 2021, and the members of the biodistrict of Trento are among the promoters. If passed, the referendum will allow the Provincia Autonoma di Trento to start discussions with the local actors for setting up a biological district recognized under a regional law, encompassing the whole territory of the province¹²: this will provide the necessary steps and guidelines for the conventional local producers to start converting to organic agriculture.

Table 4 shows the overview of the results from the questionnaire.

	Responses	
	Number of selections	% out of total respondents (single choice and multiple selection answers)
1. Motivations for the creation of a biodistrict		
a. Promotion of sustainable development	17	94%

¹⁰ Legge Regionale del Lazio, numero 11 del 12 luglio 2019. Disposizioni per la disciplina e la promozione dei biodistretti.

¹¹ Legge Regionale della Liguria, numero 66 del 28 dicembre 2009. Disciplina degli interventi per lo sviluppo, la tutela, la qualificazione e la valorizzazione delle produzioni biologiche liguri.

¹² <https://www.ildolomiti.it/ambiente/2020/referendum-bio-distretto-il-comitato-nessun-allarmismo-sara-linizio-di-un-percorso-coldiretti-al-tavolo-saremo-propositivi>

b. Promotion of organic agriculture	16	89%
c. Shortening gap between consumers, producers, and institutions	13	72%
d. Safeguarding of biodiversity	13	72%
e. Access to financing	4	22%
2. Initiators of the initiative		
a. Organic producers	11	61%
b. Local administrations and institutions	9	50%
c. Local associations (consumer groups or similar)	6	33%
d. AIAB (Italian association of organic agriculture)	4	22%
3. Most active actors today		
a. Organic producers	15	83%
b. Local associations	7	39%
c. Local administrations	7	39%
d. Citizens	4	22%
e. AIAB	3	16%
4. Representation and participation of organic producers		
a. High representation of the territory and participation to the activities	5	28%
b. High representation but medium/low participation	5	28%
c. Medium/low representation and high participation	5	28%
d. Medium/low representation and medium/low participation	2	11%
5. Participation of local associations and consumer groups		
a. Inconsistent participation	8	44%
b. High participation in planning and management of activities	4	22%
c. Low participation	4	22%
d. Other	2	11%
6. Interactions with local administrations		
a. Constant dialogue, with convergence on sustainable themes, but no concrete legal acts	7	39%
b. Dialogue with administrations with concrete legal acts on the territory	7	39%
c. Participation of administration's representatives to the activities of the biodistrict	3	16%
d. No dialogue	1	6%
7. Governance and assemblies		
a. Assemblies with low participation, but high consensus	9	50%
b. Assemblies strongly participated and high consensus	6	33%
c. Assemblies participated with disagreements	2	11%
d. Low participation with disagreements	1	6%
8. Characteristics of the territory		
a. Strong efforts from the local community to safeguard biodiversity and ecology, also in response to industrialization and conventional agriculture	12	67%
b. Strong presence of organic agriculture	11	61%

c. Attention of local community to sustainable development objectives	7	39%
d. Strong presence of virtuous local administrations	5	28%
9. Impact of activities of biodistrict on the territory		
a. Sharing of good practices and ideas between members of the biodistrict, especially concerning sustainable development and environmental issues	13	72%
b. Increase of matching between demand and supply of local products	10	56%
c. Increase of social cohesion and consensus on sustainable objectives	9	50%
d. Improved education and consciousness on dietary and food issues among citizens and consumers	8	44%
e. Increase of organic agriculture	7	39%
f. Concrete legal acts after constructive dialogue between biodistrict and institutions	5	28%
10. Characterization of a biodistrict		
a. The objective of a biodistrict is to create a space where producers, consumers, citizens, and institutions can dialogue and discuss to find solutions for the sustainable transformation of food systems	13	72%
b. The biodistrict has objectives of promotion of the territory and increase of responsible tourism	10	65%
c. The biodistrict has the objective of shortening the food chain	8	44%
d. The biodistrict is a first step for the creation of a legally recognized territorial governance instrument	8	44%
e. The biodistrict has political objectives, like an increase of social inclusion and improvement of labour conditions	4	22%
f. The biodistrict has the objective of promoting organic agriculture	3	17%

Table 4: Overview of results from questionnaire. Source: elaboration from the author, using SurveyMonkey.

2.3.1. Actors, dynamics and maturity phases

Although the biodistricts in Italy are heterogeneous because of the differences between their initial formation structures and the diversity of the territories where they have been created, nonetheless the questionnaire has given us the opportunity to highlight some evident trends and characteristics which allow some biodistricts to be considered closer to the concept of a meso-space for transformation for the local food systems where they are active. These characteristics, encompassing actors, dynamics, and objectives, integrate and complement the partial findings from chapter 2 of this research.

Organic producers: they are considered essential for the creation of the biodistrict. Whether they are already grouped in other associations (e.g., AIAB, cooperatives, or other) is irrelevant for their active participation and the efforts they give throughout the activities. In general, the size of the producers depends on the territory where they are active, but it is not necessarily a deterrent or incentive for the participation. What motivates organic producers in participating to the biodistricts seem to be, mostly, their attachment to the local community and their willingness to work together for the sustainable development and promotion of the local territory. In this, the increase in organic production (see later), is certainly included, but it is not the sole motive.

Citizens: they are not always present in the biodistricts, especially in the initial steps, but it is clear that their support is fundamental at later stages of the activities of a biodistrict. In fact, they can, on the one hand, provide the support group for pressuring and conversing with the local administrations; on the other hand, they are partially overlapping with the consumer base, and, in this case, they represent the key target group for the activities of a biodistrict, especially regarding shorter supply chains, farmers' markets, seminars for conscious buying, etc. It is evident how the presence of the citizens, as key members of the local community, is important and necessary for a legitimization of the biodistricts' activities and for creating a true meso-space and governance space between grassroots actors and institutions.

Local associations and consumer groups: local associations and consumer groups (e.g., Solidarity Purchase Groups - SPG), in a similar fashion as citizens, are not always involved in the initial steps of the biodistrict but are certainly a fundamental group of actors during the development of the activities. Although the territories with a strong social activism might advantage the biodistrict's activities, due to the local community's practice of interact with and being involved in events of associations, in some cases the presence of a single strong association (e.g., forest protection association, strong and historical SPG, visionary tourism association, etc.) might be the defining characteristic which makes a biodistrict more or less impactful in its actions. The connection with SPGs in the territory, moreover, provides a good starting point for the initiatives of shortening of the food supply chain (see also 'citizens' above), with a solid group of conscious and careful buyers, valuing the organic products supplied by the biodistricts' members. At the same time, the local associations and consumer groups could provide support in the organization of the initiatives of the biodistrict and joint sponsoring of seminars and workshops, therefore adding legitimacy to the initiatives.

Administrations: they are present within the biodistricts with different degrees of involvement. In some cases, they are the initiators of the association together with the organic producers; in other cases, they are just considered as another group of interest. In general, it is clear that a constant dialogue with the institutions is fundamental: the biodistricts which have seen concrete legislative results at local level (e.g., regulations against the use of chemical pesticides, plans for the promotion of biodiversity safeguarding, institutionalization of farmers' markets at municipal level adopting stricter organic regulations, etc.) are the ones which have constructed a solid dialogue with the institutions initially, for then cement this link through institutional initiatives. The presence of the institutions for the initial steps, although seemingly facilitating the acceptance and impact of the biodistrict at territorial level, is not fundamental, but certainly necessary through the development

stages of the association. The early interaction with the administrations also provides a setting stone for a future recognition of the biodistrict at regional level, in order to become an institutionalized association (e.g., through regional laws in Lazio, Liguria, and Toscana).

Objectives and activities: as previously mentioned, one of the main objectives for the creation of biodistricts is the development of a space at territorial level where producers, citizens, consumers, and institutions can start a dialogue about and find concrete solutions for transforming the local food systems. In this case, the sustainability of food systems, according to the interviewees and the questionnaires, encompasses organic production just as a starting point, all the way through protection and enhancement of biodiversity, improvement of dietary habits of the local population (through seminars, events, sharing occasions, etc.), promotion of valuable, slow tourism for the valorisation of the local culture and richness, and implementation of shorted food chains. Activities of the biodistricts in the formation phase might be focused on the involvement of the key actors at local level, such as active organic farmers. Later through the different maturity stages, biodistricts which seem to be more successful are involving the wider local community: tourism actors, local associations, institutions, citizens, and consumer groups are involved and invited in seminars, workshops, and discussion forums where knowledge about sustainable development is shared. Especially the presence of recognized local associations and municipalities' representatives seem to legitimize the efforts of the biodistricts.

Assemblies and governance: what seems to be clear from the interviews, and from the data gathered through questionnaires and reports' analysis, is that full open assemblies are important parts of the governance of the biodistricts, but they need to be followed by actions. In fact, in some cases the respondents made clear that, although in the starting phases of the biodistricts the assemblies were participated and ideas were shared, the momentum was somehow lost during the years of activity, mainly due to the fact that practical activities did not follow along the decisions taken during the assemblies. Polycentric governance (Ostrom, 2010; Andrée et al., 2019) is seen as a key characteristic shaping the biodistrict's life: all opinions matter and a shared consensus, on what sustainable development at local level is, seems to be present. What needs to follow swift is the practical actions which might show members the effects of their decisions. Here, also a proper interaction between all the different actors (producers, citizens, associations, and consumers) and the administrations is key, in order to go one step further into the institutionalization of certain ideas, which are just discussed oftentimes, while are put into legislative solutions (e.g., share of local produce in school canteens, frequency of farmers' markets, use of pesticides, etc.) in some virtuous cases.

In some biodistricts' cases therefore, a high degree of participatory democracy, i.e., the organized presence of civil society in the decisions affecting it (Newig and Koontz, 2014), seems to be present. Newig and Koontz (2014) list three dimensions to characterize the degree of participatory democracy: 1) representation, who is included in the decision-making processes; 2) information flows, which can range from mere access to information and one-way consultation processes, all the way to intensive mutual, face-to-face communication in collaborative management; 3) influence, which determines to what extent participants can actually affect decisions on the issues at stake.

Each biodistrict, with its peculiar activities and structure, might represent a peculiar set of participatory governance forms: biodistrict in general is certainly more inclusive than traditional planning, since it uses a variety of consultative and deliberative forms of decision making, involving both private and civil society organizations. The degree of the impact, though, is certainly dependant on the level of involvement of the local administrations, together with the decision in some cases to become an institutionalized (i.e., recognized through regional law) form of association.

When trying to find overperforming biodistricts by looking at their impacts over the years, one can take 3 answers from the questionnaire as proxies for impactful results: 9.f (concrete legislative solutions passed by the administrations after having discussed with the biodistrict); 9.e (increase of organic agriculture over the years of activity of the biodistrict); and 9.d (improved education and consciousness on dietary and food issues among citizens and consumers).

The 5 biodistricts which have selected 9.f are the ones that have started their activities in strong dialogue with the local administrations from the beginning. Some, i.e., Trento, with an incrementally closer relation, while others, i.e., Via Amerina e delle Forre, BioAltopiano, Terre degli Elimi, and Val di Vara, with an already strong connection to and support from the local institutions from the start. It seems clear that, in order to achieve concrete results at legislative level on organic agriculture and sustainable development issues in a relatively short timeframe (e.g., on average 3 to 5 years of activity of the biodistricts), the involvement of the institutions is strictly recommended (if not necessary).

Out of 7 biodistricts which have selected 9.e, 5 of them have also selected 9.d: this tells us that the most successful biodistricts have worked towards implementing sustainable and organic food production, while at the same time have also focused their activities on the local community by increasing the education and knowledge on better and more sustainable food consumption (through farmers' markets and/or seminars, workshops, and courses) of the citizens and consumers. It seems like a solidly conscious local community of consumers is the base for the improvement and positive growth of organic agriculture. For an improved education and consciousness on dietary and food issues among citizens and consumers, all of the biodistricts which have selected the answer have also stated that, in a way or another, they have had good relations with the local institutions. Closing up this section then, I will use Trento, Via Amerina e delle Forre, and Val di Vara as successful examples of biodistricts:

- Trento, for being a peri-urban biodistrict which has evolved over the years. It has been able to transform from a mere lobbying group representing the local organic producers, to a well-structured and wide-representative association, in constant dialogue with the local administration and successful in achieving concrete results at legislative level (e.g., municipal projects on safeguarding on biodiversity), while also improving local organic agriculture and influencing consumers consumption patterns;
- Via Amerina e delle Forre, which has been created initially by local administers and organic producers, but it has seen a strong participation from local associations and consumers right after the start. The collaboration with the administrations has also been solidified

through the formal recognition of the biodistrict through a regional law, which the biodistrict has helped draft.

- Val di Vara, which has been initiated by AIAB, and, although still struggling to involve the local community (i.e., associations and consumers) has one of the highest percentages of organic cultivated land out of total cultivated land, with the valley reaching more than 60% of organic production¹³. The biodistrict is working to close the gap with the civic community by organizing seminars and farmers' markets, in order to bring together the different actors of the Valley for a common cohesion on sustainable development.

The 3 biodistricts therefore represent benchmarks of biodistricts as meso-spaces of territorial transformation, all with different characteristics and formation processes. From the data gathered, it is also possible to draw some conclusions on what the strengths and weaknesses of the biodistricts through their different maturity phases are. Taking into consideration the difference among biodistricts in the involved actors, dynamics and characteristics, there are certainly some factors which are influencing the possibility of the biodistrict to become a relevant meso-space of transformation at territorial level.

Although one should always keep in mind that biodistricts are hybrid structures, changing according to the geographical and cultural contexts, I will still try to draw some connection to the cluster development, which has been analysed extensively in the past by several scholars (Porter, 1998; Becattini, 2002; Solvell et al., 2003; Martin and Sunley, 2006; Menzel and Fornahl, 2010; Lindqvist et al., 2013). These studies give a good description of clusters' structures, types and dynamics and they all highlight how the context is strongly influencing their evolution: different contexts can result in a different interpretation of similar objectives, roles, and sizes of stakeholders. Nonetheless, trying to harmonize the information collected from the interviews and aiming at having a blueprint for biodistricts as meso-spaces for transformation across different maturity phases, one can take inspiration from Solvell et al. (2003), which identify four stages of cluster initiatives lifecycles (with cluster initiatives being defined as 'organized efforts to increase growth and competitiveness of clusters within a region, involving cluster firms, government and /or the research community'): antecedence, formation, launch, and formal institution (Solvell et al., 2003). Following on the work of Zanasi et al. (2020) on cluster initiatives and biodistricts, and integrating the four stages into three stages, for mere simplification purposes, I propose to have antecedence and formation into 'Set-up', launch corresponding to 'development', and formal institution corresponding to 'consolidation'. Table 5 shows a summary of the information collected through the interviews and gives an overview of the degree of involvement of actors,

¹³ <http://www.levantenews.it/index.php/2020/09/03/varese-ligure-domenica-il-vallebio-festival/>

and the quality and characteristics of structures and activities throughout the different maturity phases for a biodistrict to be considered a meso-space of transformation.

	Maturity phases		
Factors	Set-up	Development	Consolidation
Organic producers	Presence is essential. Active participation. Representation of total organic producers can be lower, but members should be connectors at local level and active.	Presence is essential. Active participation in activities. Ideally, there should be increased representation of the territory.	Presence is essential. With growing complexity of activities and potentially formal institutionalization of the biodistrict, there might be some producers who take more active participation and representation.
Citizens	Presence is advisable. Civil society has potential to provide strong network at local level.	Presence is advisable. Degree of involvement might depend on the extension of the territory. The group might provide pressuring potential towards administrations and sense of community for activities.	Presence is essential. For a biodistrict to influence local food systems development, the presence of citizens within its members is fundamental. Education on healthy diets and conscious, sustainable consumption, increase of organic consumption, diffusion of sustainable ideas are all objectives which might be reached through a fruitful discussion with civil society.
Local associations and consumer groups	Presence is advisable. Consumer groups can provide needed support for the initial activities, also giving practical help for involvement of additional producers and organization of events.	Presence is advisable. Depending on the type of activities organized by the biodistrict (farmers' markets, seminars, workshops, recycling, biodiversity protection, etc.) the increased presence of local associations could provide a resonance base. Also, the support from groups like SPG might help in the shortening of the food chain, connecting producers and consumers.	Presence is essential. The formation of social cohesion at territorial level is an important objective to be achieved for proper sustainable development. The involvement of local associations and consumers groups might provide a launch pad for involving additional community members through word-of-mouth, sponsored events, moral suasion of the general public in the territory. As always, the presence of the associations and consumer groups is necessary for the

			proper functioning of the biodistrict as a true mesospace of transformation.
Administrations	<p>Presence is advisable. In the initial phase the administrations' presence is a nice-to-have, for a full understanding of the initiative and for the local representatives to slowly understand the potential and the role of the biodistrict.</p> <p>In large areas, involvement of the administrations is not easy, so it might be that just a selected number of administrations is included. In the case of a biodistrict with just one municipality, as expected, the interaction is easier and more straightforward.</p>	<p>Presence is essential. Collaboration with administrations could happen initially with informal supervision of projects, with constant communication on activities' status and initial simple objectives (e.g., supervision and safeguarding of urban/municipality green areas close to agricultural lands). This phase is meant to create the baseline for future solid collaboration between the biodistrict and the administration, and for future eventual legislative acts. The biodistrict should try to involve the number of local municipalities incrementally, and at the same time slowly cement the relation with the ones already involved.</p>	<p>Presence is essential, although the exact mode of membership needs to be figured out accordingly. In some cases, representatives might participate as active audience, other times as full members. In case of legal recognition through regional law, the presence of the administrations is mandatory.</p> <p>Administrations have the task of transforming grassroots and civic proposals into concrete legislative acts.</p>
Objectives and activities	<p>Objectives - Initially, promotion of just organic agriculture might be enough to create cohesion among members.</p> <p>Activities – In this phase activities might just focus on making sure members and associates are all on the same page.</p>	<p>Objectives – Enlargement of the definition of sustainability. Biodistrict should work towards creating a true space of discussion at territorial level, for finding solutions for safeguarding of biodiversity, sustainable development, and shorter food chains.</p> <p>Activities – workshops, seminars, meetings with administrations,</p>	<p>Objectives – Consolidate the dialogue between the different members of the biodistricts, which, at this stage, should ideally have all local representatives in the assemblies: citizens, consumers, institutions, producers, and local associations (social, civic, tourism, etc.). Receive formal recognition of the association under the respective regional law.</p> <p>Activities – creation of work groups internally in</p>

		<p>concrete projects at farm and territorial level for organic agriculture promotion and sustainable development.</p>	<p>order to develop and follow up on objectives. Measurement of initiatives' success. Implementation of projects in strict collaboration with all the actors, and, in particular, with the local institutions. Collaborations with academic institutions, and participation to financing calls (e.g., European Union, regional funds, etc.)</p>
Governance and assemblies	<p>Participated assemblies are advisable from the start, but clear mandate from members and consensus is essential for the biodistrict to slowly start to create a multi-stakeholdership governance since the initial steps.</p>	<p>Assemblies' participation can remain stable, as long as participants are clearly representing the territory and the local actors. Governance should slowly transform from multi-stakeholdership to participatory governance.</p>	<p>For the biodistrict to reach a full participatory democracy and higher impact at local level, there needs to be 1) high representation, with all actors included in the assemblies, with representatives in the decision-making bodies, like steering committees; 2) information flows which are happening in the fashion of face-to-face communication in collaborative management; 3) influence, where all members are auditioned and where decisions are able to influence actions of both grassroots actors (producers, citizens, consumers) and institutions (with municipality representatives implementing legislative acts).</p>

Table 5: actors, activities, and structures of biodistricts as meso-spaces of transformation. Source: own elaboration from author, using data from questionnaires and interviews.

Having further clarified the actors, dynamics, objectives, and activities of biodistricts as meso-spaces of transformation, the next section will try to characterize the agroecological transition of a biodistrict, by analysing a specific case study in Tuscany.

2.4. Discussion

The debate on sustainability transformations of food systems has gained much interest in the last years and, being a complex problem, it involves analysing the role of consumers, institutions, producers and social movements, all interested in the environmental and social impacts of conventional agriculture, and in establishing better social and economic relationships. As mentioned at the beginning of this chapter, therefore, to find applicable solutions, an interdisciplinary approach is necessary, together with a search for solutions which are mirroring the complexity of the problems, and which are taking into consideration the variety of actors which should transform and aim for a sustainable change.

The results from the interviews showed how some of the 8 biodistricts in Tuscany can be considered meso-spaces of transformation more than others: they all have different degrees of matching to the definition of meso-space and all with very different dynamics within the territory where they operate. Considering meso-spaces as territorial spaces positioned between individuals, citizens, and firms on the one hand, and institutions on the other, the interviews have highlighted how participation of grassroots actors and administrations are equally important, although at different stages of the development of each biodistrict.

Generally, all biodistricts had a strong base of organic producers, sharing ideas and knowledge among them. In biodistricts which considered themselves as successful experiences, like for example Biodistretto Montalbano, some features were highlighted as key: firstly, the social activism already present in the territory (done through associations and citizens' groups) was brought forward as an important factor positively influencing the formation and early stage of the biodistrict, in a way supporting its activities; secondly, the grassroots actors were involved from the start, and the administrations' representatives were involved right after. In fact, in this case, the local SPG, together with active citizens, made sure to contact the local organic producers to create a first base for the biodistrict to be created; right after this step, the group involved the biggest local municipality (Carmignano), to be sure that it would remain informed on the activities and aims of the biodistrict. This process, in the words of the interviewees, created a sense of identity and shared purpose, which made sure events, seminars, and consultations for policies, were participated and meaningful. In the case of Montalbano, the interviewees considered themselves as actors of change and education for sustainability in the territory. The early involvement of a strong grassroots base, and an incremental involvement of organic producers and administrations, also made sure that the biodistrict would have a solid structure with plenty of "workforce" for the organization and communication of activities, while at the same time it would be able to be more institutional when the times required it, like for example in the set-up of the green support office or the consultation for the anti-herbicide law (see previous section). Therefore, the results from the interviews showed how a strong social cohesion, thanks to historical social activism in the territory from local associations and civic groups, in a way fostered and favoured the impact of the activities of the biodistrict, increasing participation and reach. On the other hand, a self-declared

lack of social cohesion in the territory from the start (together with a lack of a grassroots base) made certain experiences (e.g. Valdichiana Aretina or Val d'Orcia e Monte Amiata) struggle to maintain a high level of activism within the biodistrict, with either a slow-down of activities (Valdichiana) or with a very low frequency of meetings and low participation (Val d'Orcia e Monte Amiata).

The results from the interviews also showed how poor involvement of either grassroots actors (consumers, citizens, associations) on one hand, or local institutions on the other, made the biodistricts falter along the years of activity. In some cases, the grassroots actors which were promoting and driving the creation of the biodistricts from the start, failed to involve the local administrations (e.g. Casentino), and this meant that local sustainable activities and practices (e.g. organizations of farmers' markets, sharing of organic knowledge among actors, etc.) remained limited to an already consciously sustainable audience, with limited possibilities of reaching a wider audience through institutional channels, e.g. through administration's sponsored events or through consultation for policy drafting. The missing involvement of institutions was deliberately chosen by the citizens, consumers, and organic producers in some cases, while in others was due to low level of interest from the local administrations themselves.

Sometimes, the biodistrict was born with the strong push from the organic producers: this might have made it easier to talk with the local administrations, being the biodistrict a relevant representative of the local agriculture, but, in some cases, there was some difficulty in reaching out to a wider audience of actors in the territory, like Solidarity Purchase Groups, citizens, and local associations (e.g. in the case of San Gimignano and Chianti).

In a specific case (Fiesole) the interviews highlighted how being recognized already as rural district and having a strong involvement from the administration would make it easier to be institutionalized and recognized at regional level, although it was unclear whether the involvement of the local population was successful.

In general, not all biodistricts can be considered as meso-spaces of transformation: the match to the definition depends very much on the maturity of the biodistrict, and their capacity and ability to really place themselves in-between grassroots and institutional actors. Although the strong base of the biodistricts, in numbers, is made up of grassroots actors in fact, it is clear that to really have concrete results, a clear communication and involvement of the local administrations is recommended. This, though, does not always happen, and it makes the biodistricts at times remain a grassroots innovation with difficulties to transform the territory and have a wider audience (let alone a concrete impact).

In the interviews, all the biodistricts considered themselves as agents of change at local level, highlighting how they are more than just groups of organic producers, and how the involvement of grassroots actors like citizens and consumers and institutions is key for their activities. It must also be highlighted how, although all biodistricts mentioned the willingness to reach and involve more grassroots actors (organic producers, citizens, consumers, associations), not all of them had a willingness or a strategy to approach and involve local administrations: this is partly due to the fear of losing some freedom and control over activities, and partly to the fact that in some cases

the interviewees felt they had not reached the maturity and the solidity to propose structured solutions to the local administrations. Some biodistricts, in fact, still saw themselves as pure spaces of discussion and not of deliberation or structured proposal. This also influenced the willingness of the biodistricts in becoming legally recognized at local level through the regional law.

From the interviews, it also appeared how the number of organic producers does not necessarily influence the biodistricts in their activities. In fact, there was in general an agreement that meetings and assemblies are participated, and the decisions taken are shared with strong consensus. Although there was not strong evidence that a higher number of municipalities would be negative for the activities of the biodistrict, it was mentioned during the interviews that the complexity required to approach structured institutional problems would make it easier when the number of the administrations involved would not be too high (implying therefore that also the extension of the territory should not be too big). In the case of the biodistrict with 15 municipalities it was clear that communication between the biodistrict and the administrations was hardly effective. The extension of the territory within the biodistrict, irrespectively of the number of municipalities, was also brought by some interviewees as a point to pay attention to: in some cases (e.g. Casentino) the structure of the territory or the valley where the biodistrict operates makes it more difficult to aggregate people, mostly due to physical reasons, making it burdensome for some members to participate to meetings, activities and events due to the physical distance to the gathering points, causing time-consuming commuting.

To summarize the results from the interviews, a characterisation model (Table 6) has been developed with the aim of listing the most important characteristics of biodistricts found from the interviews, when also considering the concept of meso-spaces for transformation at territorial level. 9 key elements are listed and are used as criteria to define semi-qualitative indices that take the form of descriptive scores from Low to Medium (a modified Likert-type scale). As an example, for the element ‘Organic producers’, the relevant indices are (Low) Low interest of organic producers in participation to the biodistrict, (Medium) Some interest in participating to activities. Not all of the local organic producers in the territory are members of the biodistrict, (High) Organic producers strongly support the biodistrict’s activities and the majority of organic producers in the territory are members of the biodistrict (Table 6).

Elements	Score (intensity and presence) within the biodistricts (from interviews)		
	Low	Medium	High
Base of citizens and consumers	Local citizens and consumers rarely participating in activities.	Local citizens and/or consumers participating in activities and events and/or having some roles in governing bodies.	Strong base of citizens and consumers from the start of the initiative, with frequent participation in events/activities and active role in strategic decisions.
Territorial activity of associations	Local NGOs and associations are not present or very seldomly	Local NGOs and associations sometimes participating actively	Strong territorial base of associations, responding

	participating in events.	in events and assemblies.	positively to events and activities and with active role in decisions.
Participation of organic producers	Low interest of organic producers in participation.	Some interest in participating to activities. Not all of the local organic producers as members.	Organic producers strongly supporting the biodistrict's activities. Majority of the organic producers in the territory are members.
Interaction with administrations	No interaction.	Some interaction, but not structured or continuous. Some communication about activities, but inconsistent. No participation of administration's members in the biodistrict's assemblies.	Involvement of administrations in activities and strategic decisions. Continuous communication and information. Participation of local administrations' members in biodistrict's assemblies.
Assemblies/forums	Scarcely participated or infrequent assemblies.	Somehow frequent and/or some participation in the biodistrict's assemblies.	Frequent, participated, open assemblies.
Common cause within biodistrict	Lack of community feeling or shared sense of identity and common cause.	Sharing of common cause and sense of identity, but divergent views sometimes.	Common cause aggregating actors in defence of something (e.g. against use of chemicals or against neighbouring polluting region).
Activities	Few events and activities organized.	Some activities organized. Participation is not always high.	Continuous and participated organization of events (e.g. farmers' markets), seminars, and trainings for both citizens and farmers.
Governance	No clear rules and hierarchical governance structure.	Clear rules for decision-making, somehow participatory processes, but necessity of majority votes (i.e. consensus sometimes not reached).	Clear rules and participative democracy. Consensus on decisions and strategies almost always present.
Social cohesion within the territory	Low degree of solidarity, trust, and interaction among the local community, citizens, NGOs, or associations in the territory.	Some degree of solidarity, trust and interaction within the local community in the territory.	Strong degree of solidarity, trust, and interaction within the local community in the territory.

Table 6: Characterization model: what to consider for biodistricts as meso-spaces for transformation.
Source: adaptation from interviews by the author.

The characterisation model can be used to analyse the biodistricts based on the information collected through interviews, reports analysis and desk research, and it can also be used to compare the biodistricts and reveal any differences in their dynamics and their closeness to the concept of meso-space.

The application of the characterisation model to the biodistricts is visualized in Figure 7: the 8 biodistricts all have similar but somehow different dynamics, actor roles and governance rules. The biodistretto Montalbano seems to be the experience that has been able to reach a certain maturity and effectiveness at institutional and grassroots level, by involving “bottom” actors (e.g. citizens, associations, consumers, organic and non-organic producers) and “top” actors (i.e. regional and local institutions). This effectiveness is also exemplified by the strong participation to organized events, high frequency of activities and the concrete results achieved through collaboration with the local administrators (e.g. green support office, limited pesticide-use municipal decree, Atlas of local seeds for gastronomic and touristic use, etc.). The other biodistricts are all performing well in some of the elements of the categorization model, with almost all of them being able to involve the local organic producers, both in membership and participation, and with the majority of them being able to develop a strong common cause and sense of identity within them. The involvement of consumers and citizens and the interaction with the local administrations, on the other hand, represent elements which are varied across biodistricts: in fact, while some are able to somehow involve top and bottom actors, in general there might be a stronger focus on producers than on achieving a wider audience at local level. This makes some of the biodistrict less close to the concept of meso-space at territorial level.

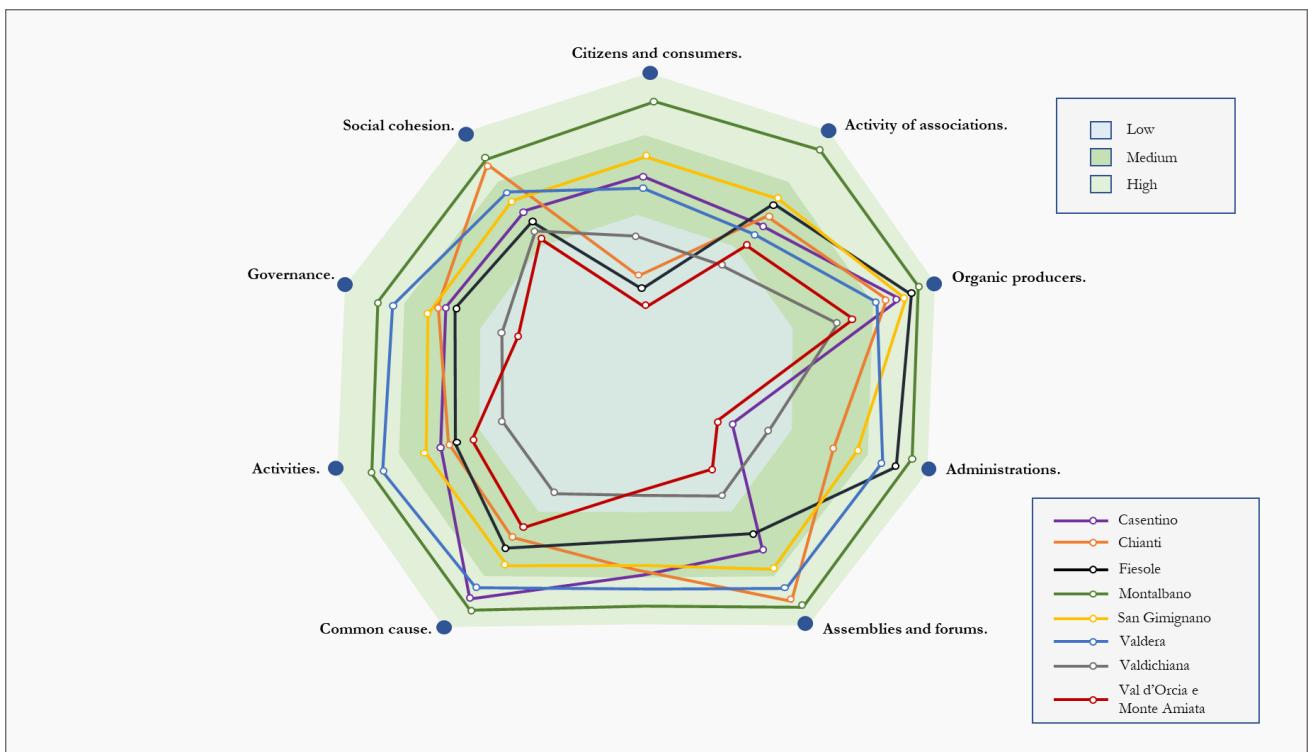


Figure 7: Visualization of the categorization of biodistricts: based on characterisation model from interviews. Source: adaptation from the interviews by the author.

2.5. Preliminary conclusions

The aim of this chapter was to verify whether biodistricts could be considered as meso-spaces for transformation of food systems at local level, therefore fostering scaling-up and scaling-out towards sustainability. The chapter has used 8 case studies from the Tuscany region in Italy. By analysing and disentangling the actors, governance rules, and dynamics within selected cases in Tuscany, we aimed at better defining what could really be a meso-space and we started to touch upon which characteristics, ethnography, culture and social traits would make certain biodistricts better candidates for being actors of change within the food and, in general, economic systems.

The main contribution of this chapter is to bring further clarity to the role of certain territorial arrangements in the discussion on food system transformation. Doing this, I have looked at the role of agency, territorial pre-conditions, and network interactions.

General considerations and conclusions can be drawn from the analysis of the 8 biodistricts. Biodistricts cannot in general be considered by default meso-spaces of transformation. This depends on a series of characteristics which have to be met, first and foremost, the involvement of the actors at local level at the right time of the implementation. The interviews showed how a likely framework for impactful action could be: in some cases, biodistricts were able to reach better and more practical results than others, mostly due to their strong base in the territory, a high number of both organic farmers and local citizens, and the involvement and clear communication of local administration's representatives through informal and/or formal channels. Especially the

informal connection with local representatives made it easier to formalize certain sustainability solutions, by being consulted and/or kept informed along the way of the policymaking of the administrations. The interviews showed there is a high level of interest from small and medium farmers at local level in joining forces and work for a more sustainable way of producing food. The interviews also showed how the activities are more participated when there is a strong support from already active social associations and from citizens' groups. The biodistrict enabled the creation of local spaces of cross-fertilization in some cases, with knowledge and ideas shared among the actors, and an increase sense of identity. Open and participatory democracy, and clear governance rules also made sure that actors within the biodistricts felt empowered and that decisions would be taken always on a consensual way.

In general, the interviews showed how certain characteristics are more important than others for considering the biodistrict as a true meso-space, able and capable of having an impact at territorial level. Based on the evidence collected, it is possible to say that the challenge of biodistricts as associations in being considered as meso-spaces for transformation of food systems and as contributors to a sustainable development of the local territory is not yet complete. Although some results have been achieved by some biodistricts and environmental and social sustainability is always the key objective in their activities, further efforts are needed. Biodistricts, though, represent a relatively young phenomenon and, as we have analysed through the chapter, both in Italy and in most countries, also specific regulations supporting these initiatives are still being developed.

In conclusion, the case of the 8 biodistricts highlights how these experiences could potentially be considered meso-spaces at territorial level and provide governance spaces to accelerate transformations of food systems locally. Our research, while promising, needs to be further expanded and other regions, with different local characteristics, need to be analysed together with an analysis of sustainability impacts.

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3. Chapter 3 - Territories and biodistricts: the emergence of biodistricts and their role for agroecological transformation of territories

The aim of this chapter is to characterize, as much as possible, the territories where biodistricts have been created and assess the impacts of the biodistricts on the sustainability of the territory where they are present.

The focus will be on the analysis of the territories where biodistricts were created in Tuscany: with the support of GIS tools, the section will aim at analysing the territories which have experienced the development and implementation of biodistricts in Tuscany. The section will sketch a descriptive picture of the territories, having a look at the levels of organic agriculture in the territory, together with data concerning soil consumption, number of associations, levels of waste sorting and photovoltaic energy production. Although the section does not aim at inferring that the biodistricts have had a direct influence in any of these measures, it does aim at characterizing the territories where the biodistricts have been created, to further understand the phenomenon.

By combining results from the interviews in chapter 2 and the characteristics of the territories from this section, the aim will be to have additional insights on the territories where biodistricts are present. The section will also try to understand why biodistricts were not created in certain areas, (e.g., Maremma and Mugello), briefly looking at these territories.

The chapter then will also aim at assessing the impact of biodistricts on the territory. By going over the concept of organic agriculture, the section will aim at analysing the impact selected biodistricts on the territory. The case studies will be Casentino, Chianti and Trento. The section will aim to understand to which extent the members within a biodistrict and, in general, the biodistrict as community are promoting agroecology, therefore going over the mere concept of organic agriculture, and bringing into the picture the concept of biodiversity, polyculture, socio-economic inclusion, and ecology, and, in general, understand to which extent biodistricts are firstly maintaining and then promoting sustainable development at local level.

Overall, the chapter will aim to conclude the PhD thesis, by also leaving space and giving suggestions for future studies e.g., on impacts of biodistricts or dissemination of governance spaces.

3.1. Insights on territories where biodistricts are present

The number of biodistricts in Tuscany is currently standing at 8. These biodistricts have been created and implemented all with diverse dynamics and local actors' involvement. The purpose of this section is to understand if there are specific characteristics of the local territories which in a way fostered and/or influenced the creation of these associations in specific places instead of others. This section does not aim to necessarily find a direct causation of a territorial characteristic for the foundation of a biodistricts, but rather it aims at giving a description of the local territory, by looking at some measures such as the level of organic agriculture out of total cultivated land in a municipality, the level of soil consumption, the level of waste sorting, the level of urbanization, the number of associations in the territory (as a proxy of social activism), the levels of photovoltaic energy production. These measures could all give a better understanding of the local territories

where organic farmers, consumers, and institutions have decided to get together and form an agreement for the formation of a biodistrict. This information will also be combined with the results from chapter 2 of the research, from which I will use some information gathered through the interviews held with the representatives from the biodistricts in Tuscany.

The objective of this section is to enrich the territorial insights on the regions where biodistricts have been created, based on the characteristics of the territories where they are formed. Given the relative novelty of the biodistricts, an analysis of the territories where they are present will help us further characterize the phenomenon and further understand their dynamics of creation, development, and evolution.

In Tuscany, the first biodistrict was officially created in 2012, in San Gimignano, while the most recent is currently under construction in the territory of Valdera, with the initial meetings among the different actors held in February 2020. As explained in chapter 2, the biodistricts have been created all with different processes and dynamics: some of them have had organic producers as key drivers of the formation process, while in other cases the local administrations have played a key role; in some cases the number of organic producers is very high compared to the total number of producers in the territory, while in other cases only a small part of the organic producers are participating; in some cases the interactions with the administrations are fruitful and continuous, while in other cases are absent; in some cases the presence of local associations as active members is high, while in other cases absent. On the one hand what unites all the biodistricts is the aim behind their formation, i.e., the diffusion of organic agriculture, promotion of sustainable development principles and sharing of information, while, on the other hand, what unites them are also the activities organized, i.e., seminars and trainings for preserving of local biodiversity, organization of farmers' markets, technical meetings on organic solutions to common agricultural problems.

The 8 biodistricts in Tuscany are touching a number of municipalities: while Fiesole and San Gimignano are associations under one municipality, there are also biodistricts which touch 15 municipalities, like the one of Val d'Orcia e Monte Amiata. What is important to highlight here is that the participation of the administrations to the activities of the biodistricts varies depending on the biodistrict: there is a strong and fruitful collaboration in Montalbano (strong collaboration with the municipality of Carmignano) and Fiesole, passing through a mixed collaboration (e.g. Chianti), all the way to very limited or no collaboration (e.g. Casentino or Valdichiana). For this reason, when analysing the territories where biodistricts are active, I will look at the municipalities where the members of the biodistrict are from, disregarding whether or not the local administration's representatives are active members of the biodistrict.

The 8 biodistricts in Tuscany have been created in territories which have diverse characteristics. The first interesting fact to notice is that some biodistricts have been created in urbanized areas while others in rural areas. Figure 8 shows the urbanized areas of Tuscany, highlighted in grey, together with the 8 biodistricts.

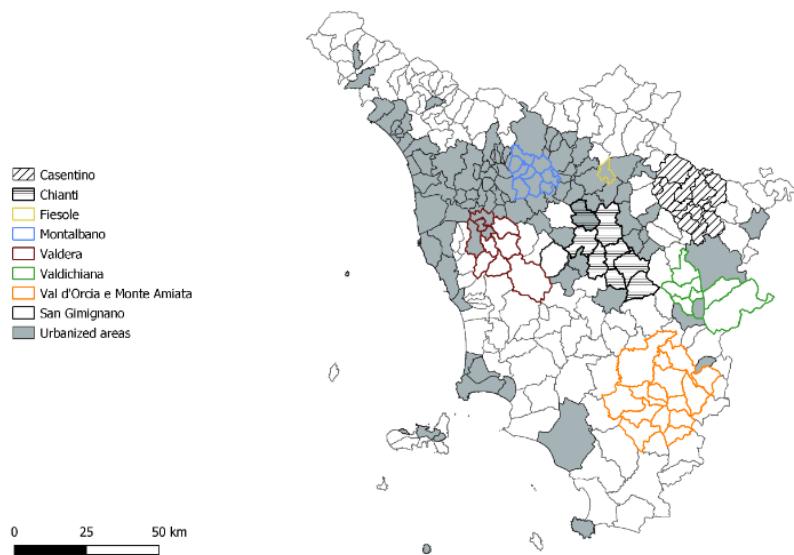


Figure 8: Administrative areas (“comuni”) in 2019, with urbanized areas highlighted in grey. Urbanized areas are defined as areas with more than 150 inhabitants per sq. Km. Source: ISTAT; own elaboration from the author using QGIS.

ISTAT - the Italian National Institute of Statistics - defines urbanized areas as the areas where there are more than 150 inhabitants per square Km. As it can be seen from the map, two biodistricts, Fiesole and Montalbano, are well within urbanized territories. These two are also the biodistricts with the strongest connections to the local administrations (Fiesole with the sole administration, Montalbano with the administration of Carmignano). Valdera, Chianti and Valdichiana are partly within urbanized territories, while Casentino, San Gimignano and Val d’Orcia e Monte Amiata are considered non-urbanized territories (or rural territories). It is here important to highlight also the high number of administrations touched by the biodistricts’ activities in Casentino and Val d’Orcia e Monte Amiata, where there are respectively 12 and 15

administrations, with little or no interaction of the administrations with respect to the activities of the two biodistricts.

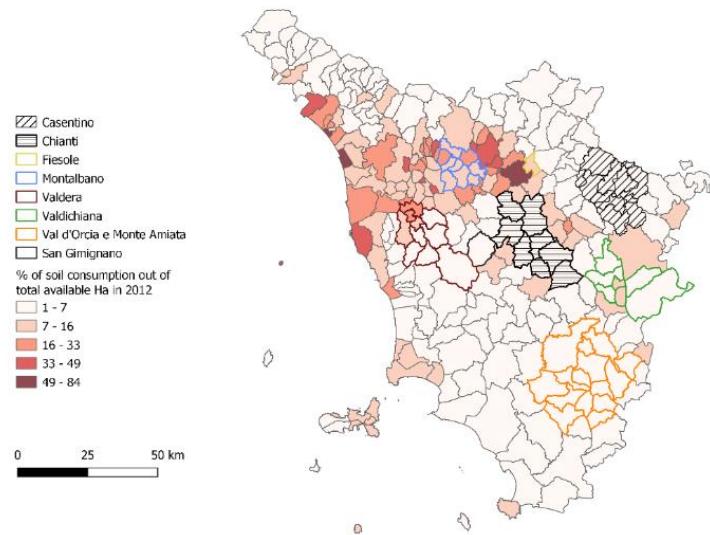


Figure 10: % of soil consumption out of total available territory. Data are per municipality. Source: ISPRA – Istituto superiore per la protezione e la ricerca ambientale; own elaboration of author using QGIS.

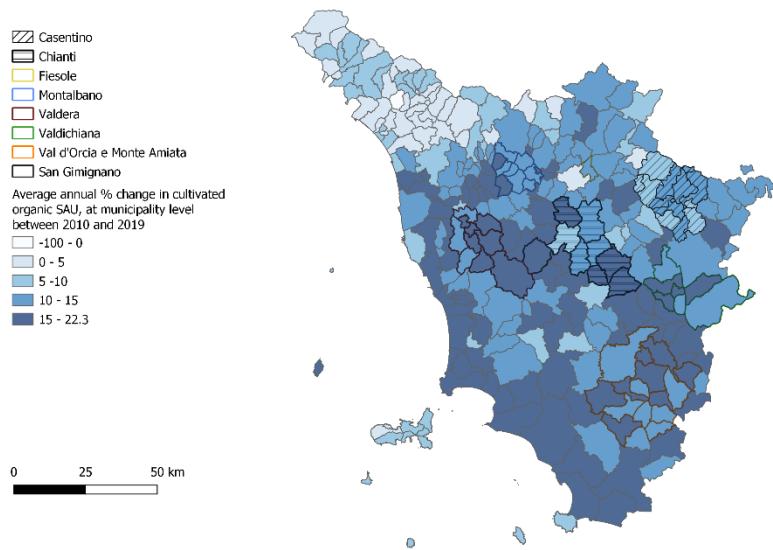


Figure 9: Average annual % change in cultivated organic land ('SAU – Superficie Agricola Utilizzata') between 2010 and 2019. Data are per municipality. Source: ISTAT; ARTEA – Azienda Regionale Toscana Per Le Erogazioni In Agricoltura; own elaboration of author.

Following on urbanized areas, Figure 9 shows the levels of soil consumption in Tuscany in 2012. Soil consumption in general is defined as an anthropogenic process which entails the transformation of natural or agricultural soils into surface covered by construction, infrastructure and other artificial surface. In this respect, ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale) defines soil consumption as a variation from a non-artificial surface (non-consumed soil) to an artificial soil usage (consumed soil): this entails the fact that it would be extremely hard (if not impossible) to restore the environmental status of the soil after the transformation to artificial land. As expected, the level of soil consumption is following the level of urbanization of the territories. It is interesting to highlight the fact that Fiesole and Montalbano are surrounded totally or in part by territories with a high degree of soil consumption, and this is in line also with the results from chapter 2: the interviewees in fact have stated how the creation of the biodistrict has also followed a need by the local actors to preserve the ‘good’ in the territory from the constant urbanization and industrialization happening in the close-by regions.

When the data on organic agriculture are taken into consideration, the picture of the territories where biodistricts are active get additional details which can help us in understanding the dynamics for the creation and activity of the biodistricts. In Tuscany, according to data from SINAB and ISTAT¹⁴ (2020), there has been an average annual increase of organically cultivated land of around 8% between 2010 and 2019 (see Figure 10 for average annual change by municipality), with the total organic lands reaching around 144.000 hectares in 2019. The organic lands in Tuscany represented, roughly, 27% of the total cultivated lands in 2019. For the territories where biodistricts are active, the average percentage of organic lands out of the total cultivated lands in the municipalities has been slightly higher, at 29%. In Tuscany, of the total cultivated organic lands, roughly 30% has been dedicated to fodder, 17% to cereals, and respectively 11 and 10 % to olives

¹⁴ Report ‘Bio in Cifre 2020’, published in August 2020 from SINAB - Sistema d’Informazione Nazionale sull’Agricoltura Biologica and ISTAT.

and vineyards (with the total of these 4 crops reaching almost 70% of total organic cultivations). When the data for the territories where biodistricts are present are taken into consideration, the average annual growth is higher than the average in the whole region: the municipalities where biodistricts are present, in fact, have seen an annual growth, on average, of 9.5 % between 2010

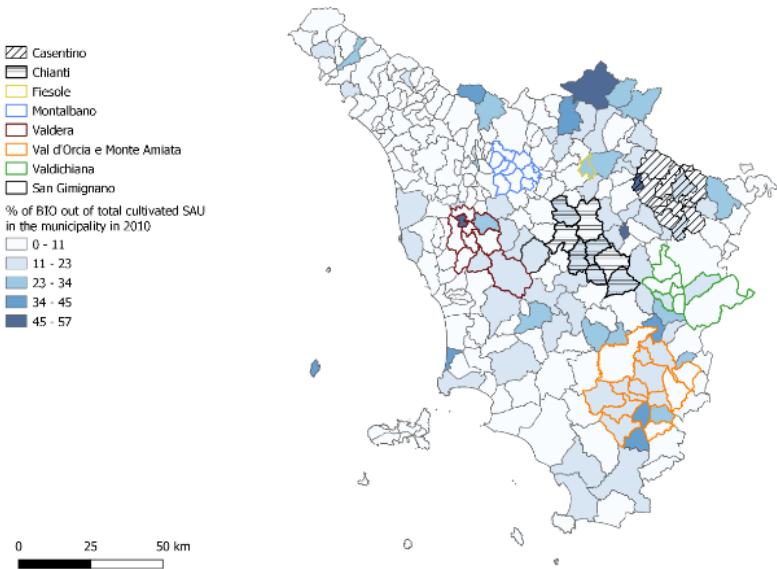


Figure 11: % of organic agriculture out of total cultivated land ('SAU – Superficie Agricola Utilizzata') in 2019. Data are per municipality. Source: ISTAT; ARTEA – Azienda Regionale Toscana Per Le Erogazioni In Agricoltura; own elaboration of author using QGIS.

and 2019.

Considering the fact that the territories where biodistricts are present represent 31% of cultivated land out of the total in Tuscany, and 34% of the organic lands out of the total in Tuscany, it is interesting to notice the higher growth in these territories.

Figure 11 and 12 show the percentage of certified organic production (following EU Regulation 834/2007¹⁵) out of total cultivated land (composed of arable land, fruit and vegetable gardens, pastures, fruit forests, etc.) within each municipality in Tuscany in 2010 and 2019. It is here

¹⁵ Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91.

interesting to notice the relatively high percentage of organic agriculture of certain areas already in 2010, like Fiesole, the Chianti region, San Gimignano, and Val d'Orcia e Monte Amiata.

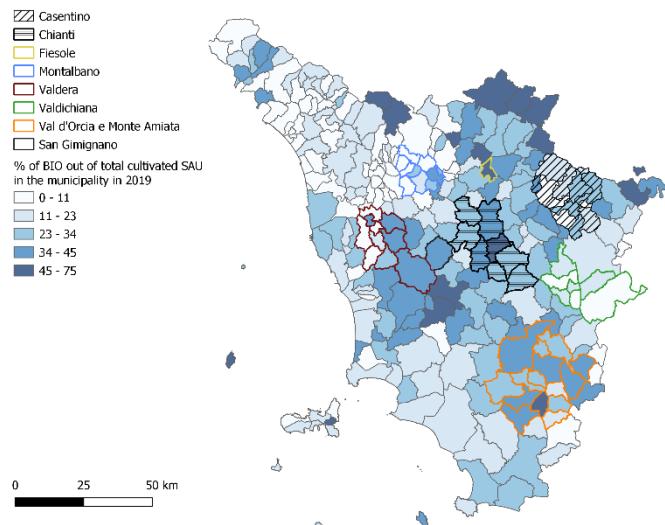


Figure 12: % of organic agriculture out of total cultivated land ('SAU – Superficie Agricola Utilizzata') in 2010. Data are per municipality. Source: ISTAT; ARTEA – Azienda Regionale Toscana Per Le Erogazioni In Agricoltura; own elaboration of author using QGIS.

It can be seen how the 4 more active biodistricts have maintained and increased their percentage of organic agriculture, while, in general, also all the other territories, excluding the Valdichiana region (which, in fact, has a less active biodistrict), have seen a big increase in organic agriculture percentages.

In the Northern part of Tuscany (Mugello region) and the Southern part of Tuscany (Maremma) one can also notice a high increase in organic agriculture numbers. These can be explained by the general trend in the whole region and by the fact that these two territories are strongly dedicated to agriculture, with the Maremma region having strong production of cattle farming, cereals, olives, and vineyards and the Mugello region having strong production of cattle farming, cereals, and fruits. Maremma, in particular, has seen in the years some of the greatest growth trends in Tuscany, thanks to the high numbers of organic farms and to the high rate of conversion from conventional to organic over the years.

The territories in Tuscany where the biodistricts have been developed have a ranging spectrum of producers, with Montalbano, Casentino, San Gimignano and Fiesole having smaller organic

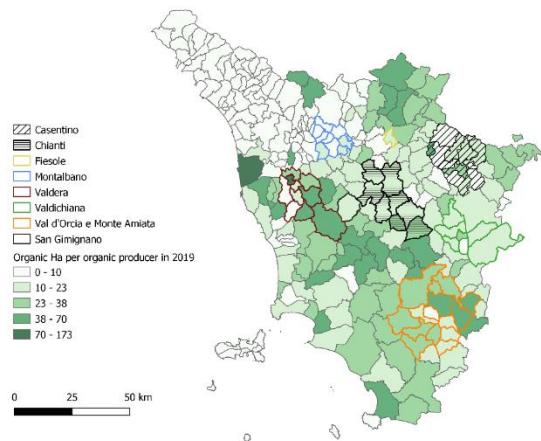


Figure 13: Organic Ha (Hectares) per organic producer in 2019.

Source: ARTEA; own elaboration from author using QGIS.

producers, with average lands that in general do not go over 23 Hectares of cultivated land per organic producer. On the other side, Chianti, Valdera, Valdichiana and Val d'Orcia and Monte Amiata have slightly bigger organic producers: in certain municipalities of Valdera, Chianti and Val d'Orcia e Monte Amiata the cultivated Ha are reaching on average between 70 and 173 Ha.

At the same time, it is interesting to notice how the average organic cultivated land every 1000 inhabitants is different in every territory, depending both on the levels of population and the size and number of organic producers. Montalbano, Fiesole, Casentino and Valdichiana have lower organic Ha every 1000 inhabitants for different reasons: Montalbano and Fiesole are urbanized areas, with a high number of population and for this reason, despite the relatively high percentage of organic production in the territory, might still have very low levels of cultivated land compared to other areas; Casentino and Valdichiana, on the contrary, despite being rural areas, still have relatively low levels of organic production out of total production (see Figure 13 above).

Valdera, Chianti, San Gimignano and Val d'Orcia e Monte Amiata, despite the higher levels of population in some municipalities, still have a high level of organic production, which characterizes them also when looking at organic Ha every 1000 inhabitants. Mugello and Maremma again stick out for their high levels of organic production also when compared to the local population.

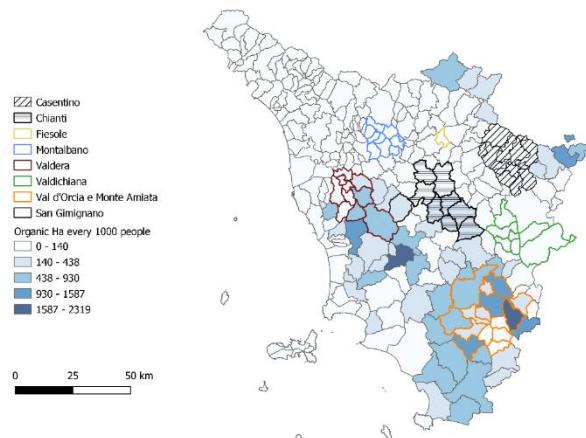


Figure 14: Organic Ha every 1000 inhabitants in the municipality. Source: ARTEA; ISTAT; own elaboration of author using QGIS.

Analysing the territories of Tuscany looking at additional elements and factors, which go over the mere data on organic production, might be beneficial to paint a more complete picture to understand the municipalities and characteristics of the places where biodistricts are active.

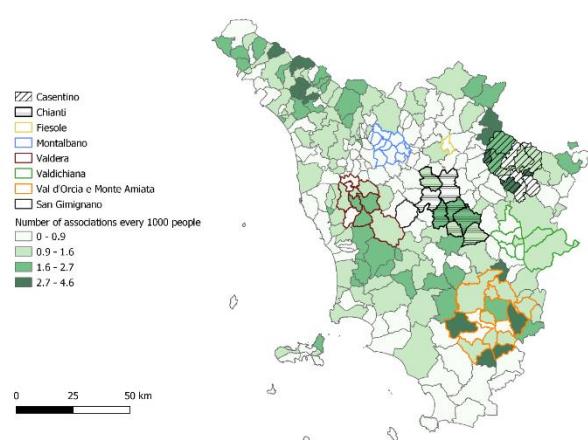


Figure 15: Number of associations every 1000 people in 2019. Source: Regione Toscana; own elaboration from author using QGIS.

Figure 15 shows the number of voluntary associations (health, cultural, social, etc.) present and active in the territories in Tuscany every 1000 inhabitants. The number of associations here is used as a proxy for social capital (Crescenzi et al., 2013), defined as “networks together with shared norms, values and understandings that facilitate co-operation within or among groups” (Keeley, 2007). The data from the Regione Toscana are presented, as always, by municipality, and they give us some interesting insights. Montalbano, San Gimignano, and Fiesole are the regions with some of the lowest numbers of associations per inhabitant (no more than 1 association every 1000 people). This, in a way, goes in a different direction in respect to some of the results from the interviews of chapter 2: especially for Montalbano and Fiesole, where interviewees stated the high social cohesion of the territory and the social activism helping the activities of the biodistrict. The results are interesting because, on the one hand, this highlights how probably it's not the number of associations that matters but rather the intensity of their activities, and, on the other, the presence of the local administration in the activities of the biodistrict (highlighted in the same interviews) somehow might compensate the lack of associations in the territory. San Gimignano also sees a lower number of associations per inhabitant: this situation is probably compensated by the strong cohesion among the local producers (interviews from chapter 2). A high number of associations per inhabitant is seen in all the other areas where biodistricts are present.

It is here interesting to notice how Maremma has a very low number of associations per inhabitant. This, combined with very big organic producers and lower number of population (due to the nature of rural area), might partly start to explain the absence of a biodistrict: the area is not necessarily devoted to the creation of associations, given the dispersion of the territory and the size of the producers which probably do not feel the need to get together. At the same time, Mugello sees a high number of associations per inhabitant: in this case, there is already a high presence of associations and cooperatives which are active in the maintenance of the local territory

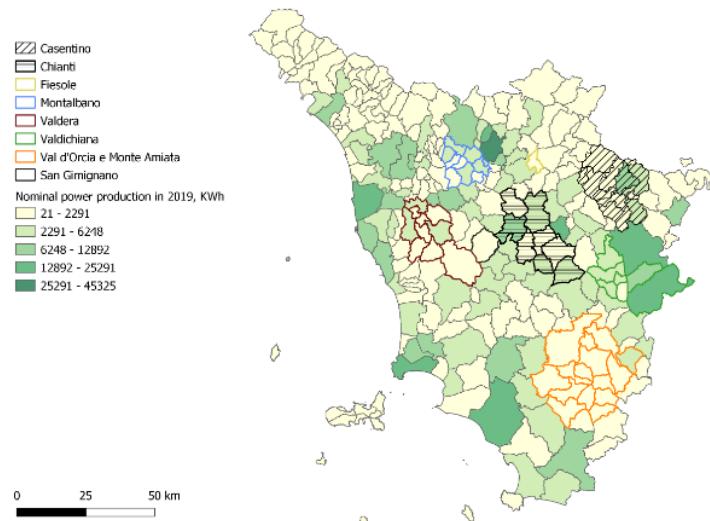


Figure 16: Nominal power production in 2019, KWh. Source: Gestore dei Servizi Energetici - GSE; own elaboration from author using QGIS.

and the promotion of local food (e.g., organic beef chain cooperatives, “comunità montane”, etc.) (Brunori et al., 2008): for this reason, the development and presence of a biodistrict, an additional association at local level, might have been deemed superfluous by the local community.

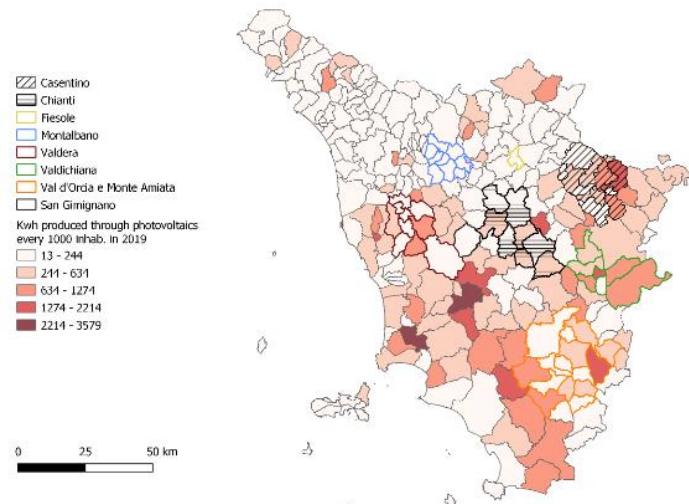


Figure 17: KWh produced through photovoltaic every 1000 inhabitants, in 2019. Source: Gestore dei Servizi Energetici - GSE; own elaboration from author using QGIS.

Taking into consideration the production of photovoltaic energy, as a proxy for the diffusion of renewable energy within territories, helps in the analysis and investigation of characteristics of the

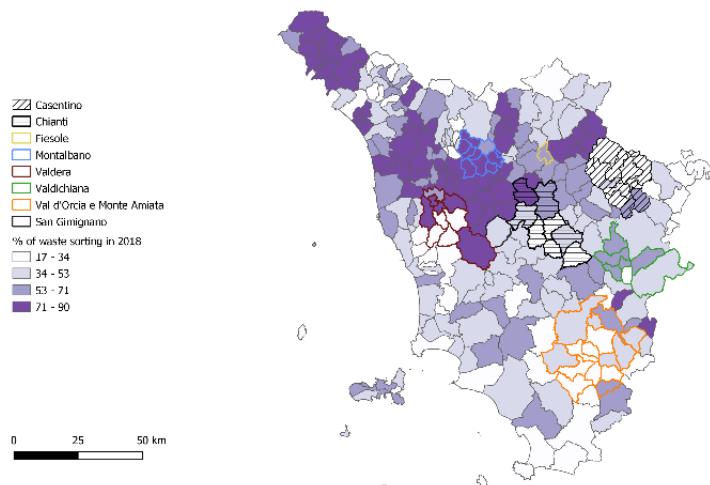


Figure 18: % of waste sorting at municipal level in 2018. Source: ISPRA; own elaboration from author using QGIS.

territories where the biodistricts are active.

Especially when looking at the photovoltaic energy produced every 1000 inhabitants in 2019 (Figure 17), one can see that Casentino sticks out as one of the region with some municipalities reaching high levels of KWh produced, especially when compared with other similar rural regions around Tuscany.

It is important to note here there is a lower production per inhabitant especially in the urbanized regions (with some rare exceptions), given the density of population of the territories.

Another characteristic defining the territories is the percentage of waste sorting at municipal level. Waste sorting ('raccolta differenziata') is usually meant as a system of waste collection which entails a first differentiation (sorting), based on the type and/or material of waste, by the citizens, which divide the waste from sorted waste and non-sorted ('indifferenziata').

Proper waste sorting and management can be seen as an element of environmental wellbeing, and an important element of sustainable development (Mesjasz-Lech, 2014). Although waste sorting does not entail necessarily waste recycling, it is anyway a necessary step to then direct waste management for a better disposal and/or recycling; therefore, a proper waste sorting in municipalities is the first phase for a proper management of the whole recycling process. Of the territories where biodistricts are present, Montalbano for sure sticks out for the high percentages of waste sorting. This could be due to either a strong role of the local administrations or to the good behaviour of the local citizens, or, more likely, it might be due to a combination of the two aspects. It is important to highlight how, in part, the higher percentages of waste sorting are overlapping with the urbanized areas, but this is not always the case. There are also virtuous numbers in certain municipalities of Valdera and Chianti, while seeing lower percentage of waste sorting in Casentino and Val d'Orcia e Monte Amiata.

To summarize the characteristics of the different territories in Tuscany where the biodistricts have been active in these years, a summary table (Table 7) has been developed, with the aim of listing the characteristics which have been deemed important for better understanding the territories. Key elements are listed and are used as criteria to define semi-qualitative indices that take the form of descriptive scores from Low to High (a modified Likert-type scale).

Characteristics of territories	High	Medium	Low
Urbanization	All or majority the municipalities of the territory where the biodistrict is active are urbanized areas.	Some of the municipalities of the territory where biodistrict is active are urbanized areas.	None of the municipalities of the territory where biodistricts are active are urbanized areas.
Soil consumption	Soil consumption is relatively high in all or majority of the municipalities of the territory.	Soil consumption is within average of the whole region.	Soil consumption is within or below average.

Characteristics of territories	High	Medium	Low
% of organic lands (2010)	Organic land percentage out of total cultivated land high, either in all or majority of municipalities.	Organic land % high in some of the municipalities.	Organic land % low in majority or all the municipalities.
% of organic lands (2019)	Organic land percentage is high either in absolute terms or relatively to neighbouring municipalities.	Organic land % high in some of the municipalities.	Organic land % lower than regional average and/or than neighbouring municipalities.
Size of organic producers	Relatively big size of organic producers (between 23 and 173 Ha per producer), in some or majority of municipalities.	Medium sized organic producers in all or majority of municipalities.	Small organic producers (below 23 Ha per producer) in all or majority of municipalities.
Associations	High number of associations (more than 2.7) every 1000 people in more than 1 municipality in the territory.	Medium number of associations every 1000 people (between 0.9 and 2.7).	Low number of associations every 1000 people.
Photovoltaic production	Relatively high photovoltaic production per inhabitant in 2018.	Medium photovoltaic production per inhabitant in 2018.	Low photovoltaic production per inhabitant in 2018.
Waste sorting	High levels (above 71%) of waste sorting in all or majority of municipalities.	Medium levels (between 34 and 71%) of waste sorting.	Low levels (below 34%) of waste sorting in all or majority of municipalities.

Table 7: Territorial insights: summary of territorial characteristics where biodistricts are present, based on case studies in Tuscany. Source: own elaboration from author using combination and interpretation of data from ISTAT, ARTEA, ARPAT, ISPRA, GSE (2010, 2012, 2018, 2019, 2020) and interviews from chapter 2.

Overall, all territories where biodistricts are present have different characteristics which define them. In Figure 19 a summary of the 8 territories is provided and a summary of how they are performing in the 8 characteristics listed in Table 7. From this, I will draw some preliminary conclusions on the type of territories where the biodistricts are forming in Tuscany, which can then be used to assess other territories and biodistricts in Italy, better understanding which factors might favour their creation and activities at local level.

In general, there is a high percentage of organic production in all territories where the biodistricts are present. This trend is seen both with the numbers for 2010 and for 2019. Valdichiana sticks out for the low levels of organic production across its municipalities, both in 2010 and 2019, while Montalbano positively performs: the latter, in fact, although starting from low levels of organic production in its municipalities (low levels of % of organic lands out of total cultivated lands), has seen a high increase across the years, especially when the numbers are compared to the

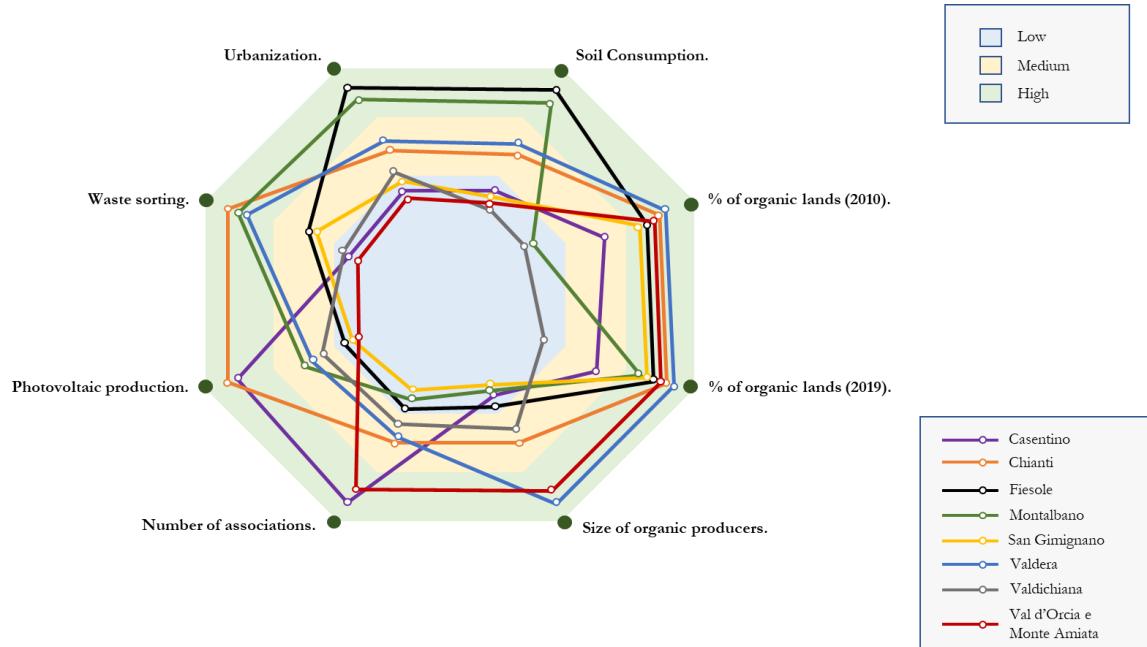


Figure 19: Categorization of territories where biodistricts are active. Source: own elaboration of the author based on analysis of characteristics.

neighbouring municipalities, where the organic production has remained stable or in some cases has dropped. This is confirmed also by the interviews with the local actors, which have highlighted how the decision to form the biodistrict has been also to preserve the territory from the neighbouring industrialization and loss of biodiversity.

The size of organic producers, on the other hand, varies according to the territory under analysis: although 4 out of 8 territories have smaller organic producers, the other 4 territories see much higher levels of hectares per producer. The 4 territories with smaller producers, coincidentally, are also the ones which have seen the development of the biodistricts at an earlier stage compared to the others. In fact, Valdera and Val d'Orcia e Monte Amiata, with sizeable, bigger organic producers, have just recently started the association or the process towards the formation of the biodistrict (Val d'Orcia e Monte Amiata in 2018 and Valdera in 2020). This might signal a harder path to reach an agreement between organic producers in these two territories or a slower recognition of the potential benefits of forming a biodistrict. The number of associations already present in the territory does not seem to have affected the propensity of the same territory to form a biodistrict, given the fact that the number of associations every 1000 people vary much across

territories. The same can be said for photovoltaic production and waste sorting, with the numbers varying across the territories.

3.2. Preliminary assessment of the agroecological transition of biodistricts.

The evidence of biodistricts' contribution to sustainability remains fragmented, because of the heterogeneity of their structures and the diverse characteristics and activities they have on the territories where they are present. This section of the chapter aims at having a first attempt on producing and consolidating evidence on the multidimensional performances of biodistricts in their role for the sustainability transitions of food systems.

This section therefore has the objective of applying the Tool for Agroecology Performance Evaluation (TAPE), developed by FAO in 2019, in order to assess the degree of transition to agroecology of the farms within biodistricts and communities/territories where the biodistricts are present. This will be done by using descriptive scales and scores developed by FAO in the Characterization of Agroecological Transition (CAET) model within the TAPE: this model is based on the 10 elements of Agroecology¹⁶ adopted by FAO, and it will support us in assessing the extent of agroecological transition among agricultural producers in the territories of the biodistricts.

Agroecology is defined as an alternative and systemic approach which relies on local and ecological knowledge, improving social capital and finding alternative solutions to the proliferation of chemical inputs for the agriculture production (HLPE, 2019).

The application of part of the TAPE framework to selected cases of biodistricts is a first step, aiming at analysing the impact of biodistricts at local level concerning the transition towards sustainability of agri-food systems. A growing body of literature, in fact, has demonstrated over the last years that agroecology has positive impacts on environmental aspects, on food and nutrition security, and on farmers' income (Gliessman, 2015; Luna-Gonzalez and Sorensen, 2018; Van der Ploeg et al., 2019; Mottet et al., 2020).

In general, the elementary unit for agricultural management is the farm but, for an agroecological transition to take place, the community and the territorial level is the scale where the necessary processes for the full transition need to happen (Gliessman, 2015). For this reason, it makes perfect sense to apply the CAET section of the TAPE framework to a higher level, therefore by taking a systemic approach, and by assessing the landscape, the territory, or the community.

¹⁶ <http://www.fao.org/agroecology/knowledge/10-elements/en/>

As highlighted also by Mottet et al. (2020), particularly the CAET section of the framework can be applied at a higher level, by consolidating and aggregating results to the territory/community level. The scholars suggest a purposeful sampling, in order to provide a territorial snapshot by selecting meaningful local farms, or by collecting information from the local representatives which might have the vast majority of the information (e.g., the presidents of the biodistricts). In this case, the term ‘territory’ might refer to strata such as one or more municipalities where the biodistricts are present and active.

The CAET characterizes the degree of transition to agroecology of an agricultural system, based on the 10 Elements of Agroecology and it will be completed as a guided exercise with the representatives from selected biodistricts. The application of the quali-quantitative framework will help us assessing the degree of transition towards agroecology of the territories where biodistricts are present, therefore measuring the impact on key attributes necessary to achieve the UN Sustainable Development Goals (SDGs)¹⁷ and other sustainable objectives (Mottet et al., 2020).

This section will close this chapter and the research, informing us how far certain territories have progressed in their agroecological transition, and it will contribute to better describing and defining the impact of biodistricts in diverse contexts. The application of the CAET will therefore allow us to have a snapshot on the situation concerning the sustainability of certain territories and will aim at collecting and building results that will:

- Inform and empower producers and local stakeholders regarding the status of their sustainable practices at local level;
- Inform and empower local institutions by creating data-driven insights on the performance of agroecological transitions and creating the base for meaningful and impactful sustainable policies;
- Identify strengths and weaknesses which might foster and/or slow down the sustainability transitions at local level and identify the areas where local stakeholders need to focus their work on.

The TAPE CAET framework (which can be found in detail in the Annex B of this chapter) assesses the sustainability transition of a territory by analysing different agronomic and socio-economic topics of the farms and stakeholders within territory and by looking at:

1. Diversity: increasing the biodiversity of a territory contributes to a range of benefits, such as better production, improved socio-economic wellbeing, higher nutrition of the food produced and increased environmental sustainability. The diversity in the questionnaire is assessed by looking at crops’ diversity, animal welfare and adoption

¹⁷ <https://sdgs.un.org/goals>

within the farm, the use of agroforestry and forest management, and the degree of diversification of activities of the farms involved within the territory.

2. Synergies: great attention is given to the design of diversified systems combining annual and perennial crops, livestock and aquatic animals, trees, soils, water and other elements within farms and external landscapes, in order to enhance and improve synergies for sustainable food systems. Level of synergies is assessed by looking at the integration between crops, livestock and aquaculture, the management of the soil-plants system, and the degree of agroforestry and silvopasture.
3. Efficiency: improving the outputs of agriculture by using less quantity of and more sustainable (i.e., organic) resources is key for a territory to become truly ecological. The questionnaire assesses the level of efficiency by looking at the use of chemical fertilizers and pesticides, along with the level of productivity: the less chemicals and more productive (also in terms of economic surplus) the farms are, the better the levels of efficiency of the territory.
4. Recycling: territories which apply ecological practices have less impact on the ecosystems in terms of waste. Therefore, more sustainable territories have higher levels of recycling of organic materials and by-products within the agricultural and, in general, the socio-economic processes. In the questionnaire, recycling is assessed by looking at the level of recycling of biomass and nutrients (e.g., crop residues used as animal feed), the methods for water harvesting and the practices to limit water use, the level of exchange and self-production for seeds, and the production and use of renewable energy.
5. Resilience: the capacity of a territory to recover from climate disturbances like droughts, floods, and diseases (of plants and/or animals) is key for assessing its levels of sustainability. In fact, complex, diverse agricultural systems and ecosystems make sure that nature self-regulate as much as possible: diversified landscapes have greater potential to control diseases and pests, and greater potential to also reduce vulnerability to external economic shocks. The questionnaire assesses the level of resilience through analysing the stability of a territory's income and agricultural production, the level of financial indebtedness, and the social cohesion of the community in supporting each other after ecological and/or socio-economic shocks.
6. Culture and Food Tradition: local cultural traditions and practices offer a vast amount of experience in dealing with sustainable solutions for agroecological transitions. The questionnaire assesses this topic by looking at the level of healthy dietary consciousness in citizens and consumers and the use of local produce within the territory.
7. Co-creation and Sharing of Knowledge: the co-creation and sharing of knowledge on sustainable agricultural practices between stakeholders and actors in a territory, starting from farmers and going all the way to citizens and local administrators, is key for speeding up the transition to a socio-economic sustainable transition of the full territory. The questionnaire assesses the level of knowledge creation by looking at the platforms for knowledge transfer across the community, the level of education on sustainable topics of the local farmers, and the level of interconnection of the different local stakeholders.

8. Human and Social Values: when addressing sustainability, the protection and improvement of livelihoods, along with the promotion of equity and social well-being is key. For this reason, the questionnaire assesses human and social values promoted within a territory by looking at the level of empowerment for women and young generations and the current level of social inequalities (e.g., access to capital and decision-making power), and the labour conditions of workers within farms.
9. Circular and Solidarity Economy: developing and designing food systems based on the principles of circular economy would help socio-economic systems in being more resource efficient, by shortening the food chains and by strengthening the incomes of food producers, to include innovative local markets alongside more traditional markets. The questionnaire assesses these types of economies by looking at the geographies of markets (reliance on external markets, i.e., local, regional, global), the strength of market intermediaries and the level of interconnection between consumers and producers, the solidity of local food systems and markets.
10. Responsible Governance: for sustainable and ecological systems, responsible governance mechanisms are key. In fact, territorial, landscape and community level governance are extremely important to foster cooperation between the different stakeholders: the questionnaire assesses the level of responsible governance by looking at the level of empowerment of the local producers, the number and the activity of organizations and associations, and the level of participation in the management of land and natural resources.

The selected biodistricts for the application of the CAET-TAPE assessment tool are:

- Trento (peri-urban environment)
- Casentino (rural environment)
- Chianti (mixed environment)

The choice of these biodistricts has followed criteria of landscape representation (with the aim of having a good representation of different landscapes, i.e., rural, peri-urban, and mixed), farm size representation (i.e., Casentino: smaller farms; Trento: small-medium; Chianti, medium), and representation of the degree of involvement with the local administrations (i.e., high for Trento, medium for Chianti, low for Casentino). This purposeful case selection has therefore aimed of bringing a good diversity, while at the same time an insightful array of data and information.

The application of the CAET-TAPE to these biodistricts aims at furthering the research agenda on sustainability transitions of food systems and biodistricts, by beginning to provide data on the characterization of agroecological transitions in territories where the biodistricts are present. This section of the research therefore should support practitioners and policymakers in addressing questions such as how many local farms are engaged in an agroecological transitions, how far the local stakeholders have progressed in sustainability transitions, what combinations of practices are most common in the local territory, which regional and territorial characteristics are linked with local economic, social, and environmental impacts at local level. Moreover, the results might support all stakeholders in understanding what could foster agroecological and sustainability transitions, and what might be weakness and strength points to work on.

The research will hopefully provide a baseline and framework for farmers, institutions, and, in general, stakeholders and actors within sustainability transitions for adapting and/or re-designing development programmes with concrete steps for sustainable development at local level, and for evaluating policies to properly address sustainable agriculture issues within the context of the UN SDGs and new targets to increase biodiversity and combat climate change.

3.2.1. Biodistretto di Trento

Biodistretto di Trento is a no-profit association officially set-up in 2018 and currently counting more than 125 organic producers within the local administration of Trento. The producers, members of the association, are focusing mainly of vineyards, but they are also producing fruits, vegetables, and other crops, although in smaller amounts.

The Comune di Trento (both as geographical area and local administration of Trento) currently has a total of 1'750 Ha of cultivated land, with ca. 820 Ha of land cultivated by the members of the biodistrict: all of these 820 Ha are organically certified. The biodistrict is therefore representing a very good share of the local territory.

The biodistrict has been first developed by 13 key organic producers, in 2016, with the aim of creating and sharing knowledge between local stakeholders, with a focus especially on the role of agriculture in improving biodiversity and implementing sustainable development, and with a focus on the role of local farmers for preserving the environment and promoting sustainable practices. The members of the biodistrict, according to its president, believe the biodistrict is not only an agricultural association but also a cultural one, since the safeguarding of the local biodiversity is seen as a historic, environmental, urbanistic, and social objective. Local restaurant owners, tourism representatives, representatives from the institutions have been involved, so that the biodistrict can offer a meso-space, an intermediary space of discussion not only between urban and peri-urban/rural spaces, but also between the different stakeholders.

The biodistrict, as mentioned before in the chapter, is also aiming to involve more and more administrations within the autonomous province of Trento, and they are trying to make a citizen referendum pass so that the Province's council should discuss the possibility of creating a biodistrict on the whole province area, therefore involving all the administrations and stakeholders (and not only the ones under the 'Comune di Trento' where the biodistrict is currently active).

Figure 20 below shows the results of the application of the CAET framework across the 10 key topics of agroecology, as defined by FAO. The average score for the whole biodistrict of Trento is 66% and this characterizes it as a system with an advanced transition to agroecology.

Human and Social Values is the area where the biodistrict is excelling the most. The interviewees in fact highlighted how within all the companies which are members of the biodistrict of Trento there is a very high attention to topics such as gender empowerment, labour conditions, youth empowerment and animal welfare. Within these companies and farms, the whole family is involved in the production processes and all the members have complete power over decisions, being able to reach economic and financial stability independent from the agro-industrial dynamics which might influence the outcomes in other regions. Locally, there is a cooperative ('Cantina Sociale')

which aims at preserving the autonomy and wellbeing of the local producers and it collaborates strongly with the biodistrict. The biodistrict, moreover, favours economic and social equality among producers, and it stimulates discussions between all farmers on how to increase socio-economic wellbeing for all. It is also interesting to highlight how, in the member companies of the biodistrict, the younger generations see their future in agriculture: sons and daughters of the founders of certain companies are taking their helm, and this might be due to both the economic benefits of running the company and the social wellbeing generated by a strong community and association (biodistrict) supporting the activities of the farmers.

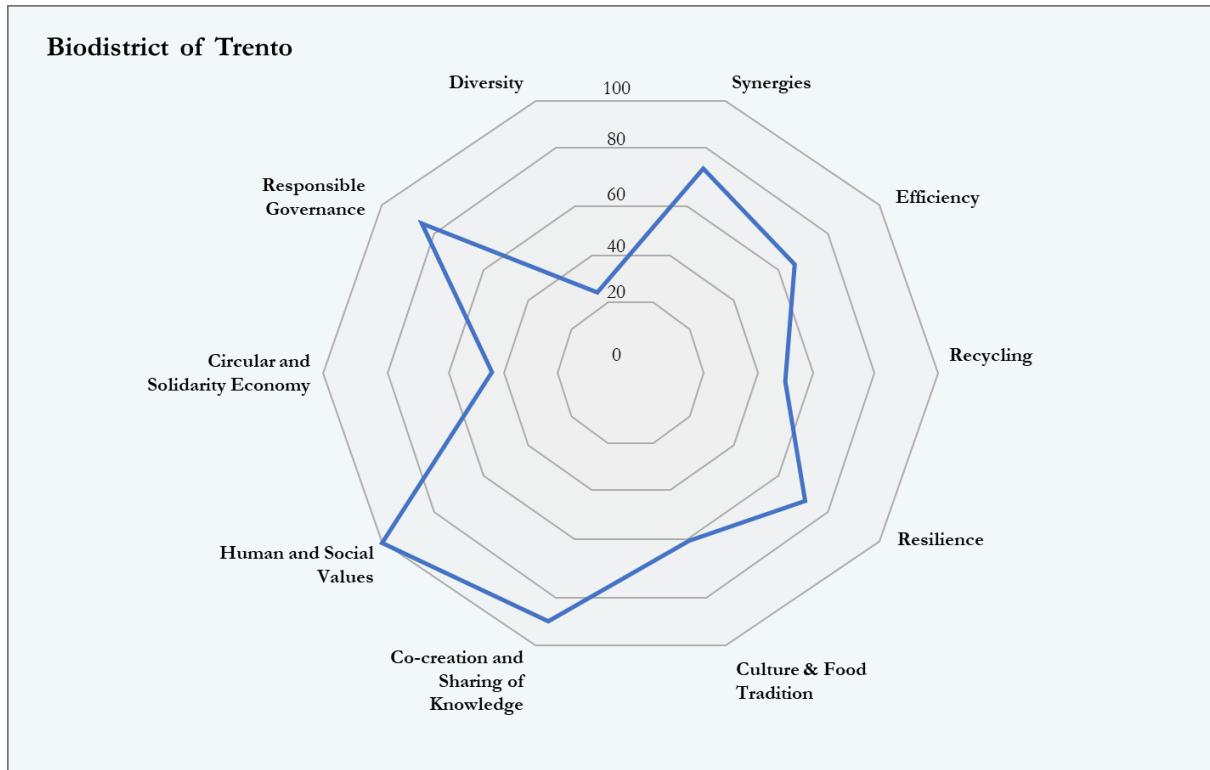


Figure 20: Results of the CAET (Step 1) from the analysis of the farms members of the biodistrict of Trento. Source: data collected from the author through direct interviews and desk research.

The strong sense of community is also exemplified by another characteristic of the biodistrict: the Co-creation and Sharing of Knowledge. The farmers which are part of the biodistrict are strongly interconnected with the local community and they often participate to events, meetings and seminars with other associations and the local stakeholders. The topics addressed in those events are usually related to agroecology and innovative practices for the transition to regenerative and organic agriculture: the interviewee highlighted how the younger generations are involved. At local level, moreover, the biodistrict of Trento is the main facilitator of training courses, which are done in collaboration with the local cooperatives (e.g., ‘Cantina Sociale’) and are open to organic and non-organic producers, therefore also offering a first space for discussion on what is needed for conventional farmers to convert their production to organic/regenerative agriculture.

On the Diversity (of crops and activities within farms), the members of the biodistrict have some potential to get better. In fact, across all the topics of the framework, the Diversity is where the farms are scoring the lowest. Looking at diversity of crops and husbandry, farms are focusing quite extensively on only one crop, cultivating, for the most farms, grapes for wine, and dedicating to this crop more than 80% of their cultivated land: although specialization is not a bad thing per se, the over-production of only one type of crop might make it more difficult to reach a more sustainable food system locally. Just a few farms, consequently, are dedicating some space for husbandry, and usually there is only one species of animals bred. The farms are scoring slightly better on the diversification of the ecosystem, thanks to the presence of (more than one species of) trees in their lands, therefore allowing a good integration with the landscape and allowing for some agroforestry in selected farms. In general, though, the farms which are members of the biodistrict are struggling to diversify their activities: most of them (more than 90%) are dedicating their lands and resources to just one activity, with only a few of them (ca. 5%) being able to diversify their offers, e.g., by also doing some production transformation or by offering eco-tourism services. It is here important to highlight that, although diversification is an area of improvement, the activities are performed with a high degree of Synergies, with a high attention to natural soil fertility, a strong focus on integration with the ecosystems, and a high attention to biodiversity, together with a high degree of Resilience, i.e., with the farmers paying great attention, as a community, to economic stability, a strong ability to access financial credit, and possibility of using a cooperative system of insurance.

The Recycling (of energy and resources) is an area for improvement, since, although water and waste are managed and recycled sustainably thanks to high waste sorting percentages in the Comune di Trento (more than 80%) and thanks to the use of water management systems (e.g., drop systems, timed systems, cover crops, etc.), the farmers are still using electricity which is not necessarily produced from renewable sources, with just a very small percentage of farmers (ca. 10%) using a certain degree of photovoltaic energy, thanks to systems installed in their lands and buildings.

Another area of improvement for the biodistrict within the territory is the implementation of a full functioning Circular and Solidarity Economy. In fact, although some local markets for organic farmers to sell their produce are present, the commercial networks are still weak: in the 80s in the region there was a division of responsibilities between cooperatives taking care of production and cooperatives taking care of the commercialization of the products, and this set-up would help the farmers in getting the products sold in the local and regional markets. Today, according to the interviewee, the system is a bit in crisis, due to the fact that the system has not adapted and/or changed over the last decades and the majority of the products are commercialized in non-local markets.

The future has a positive outlook though. Thanks to high levels of Responsible Governance, exercised either through mechanisms for the sustainable use of resources and lands (the so-called

‘usi civici’¹⁸) or through the strong empowerment of support organisms like the biodistrict and its interaction with the local municipality, the biodistrict is active in the territory and, with a total average score of 66%, it can be considered overall a system in advanced transition to agroecology.

3.2.2. Biodistretto del Chianti

Biodistretto del Chianti is a no-profit organization officially set-up in 2016 (although with previous similar organizations already set-up in 2012 and 2013, with different names, and later merged). The biodistrict includes a number of farms which are in the production area of the Chianti Classico DOCG (Denominazione di Origine Controllata e Garantita – Controlled and Guaranteed Denomination of Origin) and it touches a number of municipalities in Tuscany, including Greve in Chianti, Gaiole in Chianti, Castellina in Chianti, Radda in Chianti, Castelnuovo Berardenga, San Casciano, Tavarnelle and Barberino.

Figure 21 shows the results of the application of the CAET framework across the 10 key topics of agroecology, as defined by FAO. The average score for the whole biodistrict of Chianti is 55% and this characterizes it as a system with an incipient transition to agroecology.

As in the case of the biodistrict of Trento, for the Biodistrict of Chianti the Human and Social Values and the Co-creation and Sharing of Knowledge are the areas of excellence, with a respective score of 91% and 83%. Although the farmers which are members of the biodistrict can still improve their knowledge around agroecology and regenerative agriculture (in fact, ‘access to agroecological knowledge’ has a score of 2 out of 4), there is a high participation of the farmers in the local events and there are various knowledge platforms (e.g., SPEVIS, Stazione Sperimentale per la Viticoltura – Experimental Station for Viticulture) which are interconnected between them and are all linked to the biodistrict which catalyses sustainable, transformational knowledge in the territory. According to the interviewee, nonetheless, the last years have seen an overall increase in the knowledge of sustainable topics among the members of the biodistrict, with a renewed and intense interest in agroecological practices for agricultural production.

It is here important to highlight that more and more farms are starting to understand the importance of organic agriculture in terms of economic benefits (in addition to social and cultural benefits for the community) and this has had a positive impact on the younger generations, which are now, according to the interviewee (the president of the biodistrict), starting to take the helm of agricultural firms in ever-growing numbers. This, combined with good labour conditions, makes the safeguarding and promotion of human and social values an important part of the biodistrict.

¹⁸ More information here: <https://www.consiglio.provincia.tn.it/leggi-e-archivi/codice-provinciale/Pages/legge.aspx?uid=12402>

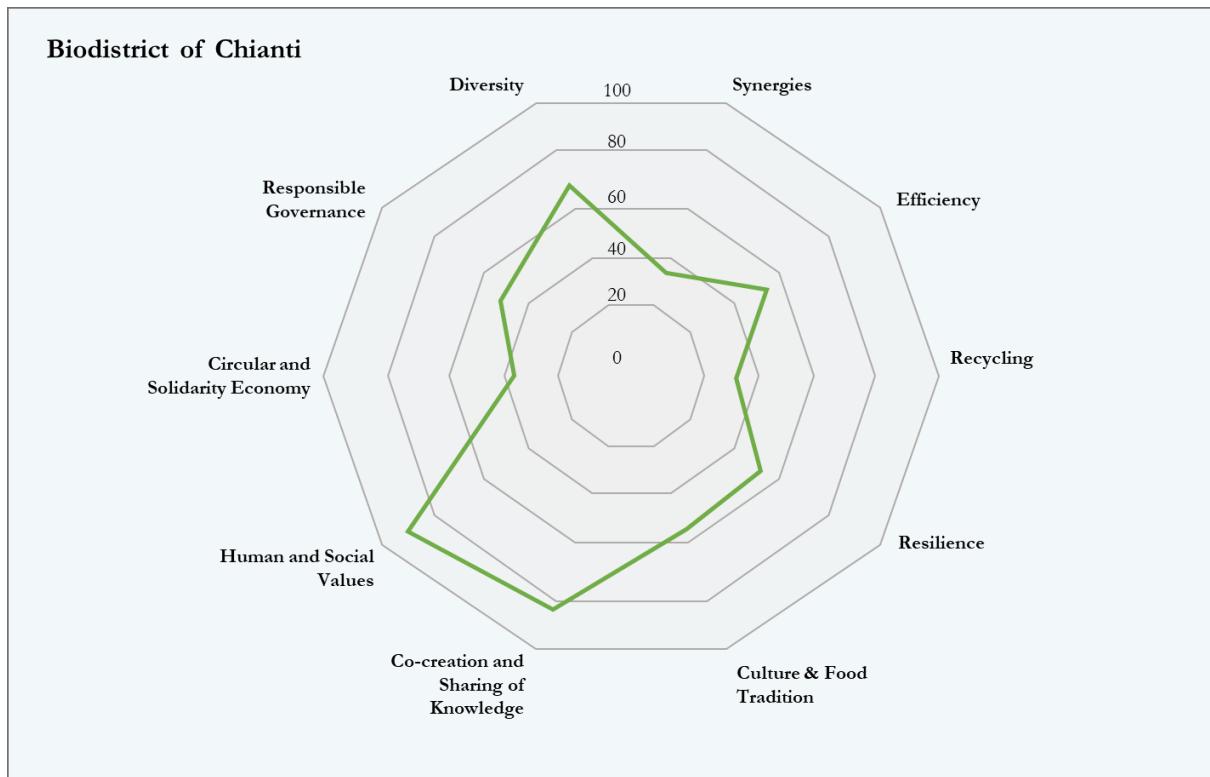


Figure 21: Results of the CAET (Step 1) from the analysis of the farms members of the biodistrict of Chianti. Source: data collected from the author through direct interviews and desk research.

Recycling (of energy and resources) is an area of improvement, since at the moment only a few percentage of farms are producing and using renewable energy in their farms. Moreover, there is still some work to do for the members of the biodistrict in order to re-utilize and recycle the subproducts of the farming processes. This is strongly connected to another area of improvement, which is the integration of agroforestry and silvopasture, at the moment lacking. Moreover, although there is a fairly good interconnection between the different production areas in the biodistrict with the non-cultivated areas (thanks to margins, bushes, canals, etc.) there is a low integration with animal husbandry and the other crops' production, when present, therefore making the Synergies area something the biodistrict will have to work on in the future as an additional improvement area.

The development and implementation of a Circular and Solidarity Economy in the biodistrict of Chianti (and, in general, in the whole Chianti area) is still far from being reached. Some local markets are present but still very limited in frequency and extension, but the biodistrict is working together with its associates to create stronger relations with the local consumers and with the local Solidarity Purchase Groups ('Gruppi di Acquisto Solidale'), creating a virtuous circle of increased diversified production with a potential local market. The producers of agriculture-related products at local level in Chianti are relying to a grand extent to intermediaries and commercialization companies: although in the past some cooperatives were formed ('Cantine Sociali'), they failed in their survival, and this has meant that small-medium producers have to rely on bigger intermediaries and sometimes industrialized producers for selling their produce. The biodistrict

knows this is an area of improvement and is working also with the local administrations and (national and regional) research institutions to increase Diversity of production and allow for a better and more sustainable food system (production, commercialization, and consumption), while still maintaining the economic benefits of a specialized production in winemaking. The farms which are participating in the biodistrict are on the other hand performing quite well when the diversity of activities and services is considered: in fact, almost all of the members are performing transformation activities of their produce on the farm (e.g., transformation of produce into oil, wine, jams, etc.), they are offering catering services (either through restaurants or for company/wedding events), and they are in general working in the area of slow and eco-tourism, by diversifying their income sources, and making their activities more resilient. An area of improvement highlighted by the interviewee is the lack of a variety of trees and other perennials in the biodistrict: in fact, although some species of trees are present, the biodistrict is working with the local stakeholders towards increasing the presence of trees in the territory and integrate them within the farmland (e.g., agroforestry), also through the participation in nationally and internationally funded research projects.

In general, the biodistrict, with a total average score of 55%, can be considered an overall system with an incipient transition to agroecology. This, coupled with the importance of the territory and its (winemaking) production in the regional and national economy, is something extremely valuable for the sustainable development of the community. The role of the biodistrict will be therefore pivotal, thanks also to its aggregator and coordinator role, providing a structure for stakeholders to get together and unite for common, shared causes across municipalities. The biodistrict plans to improve its agroecological approach over the near future, by collaborating even more with the local institutions (e.g., better management of lands, improved communication on municipal legislations, increase of production diversity and local market access, etc.), and by involving an increasing number of stakeholders, such as citizens, consumers, associations and conventional farmers aiming to convert to organic agriculture: this will be done also through the recognition under the regional law, which will provide, according to the interviewee, additional governance instruments for the sustainability transition of the territory.

3.2.3. Biodistretto del Casentino

Biodistretto del Casentino has been formed as a no-profit association in 2014 by a small number of local organic producers. The biodistrict stretches over a number of municipalities in the province of Arezzo, including Bibbiena, Capolona, Castel Focognano, Castel San Niccolò, Chitignano, Chiusi della Verna, Montemignaio, Ortignano Raggiolo, Poppi, Pratovecchio Stia and Talla. The territory is considered ‘rural’, with a varied production of vineyards, olive, cereal, vegetables, and fruit.

The biodistrict is characterized by the presence of organic producers (certified following the EU organic standard) and a number of organic producers which are certified by the community,

following the Participatory Guarantee System (PGS)¹⁹, defined by IFOAM (International Federation of Organic Agriculture Movements) as a ‘locally focused quality assurance system [...] certifying...] producers based on active participation of stakeholders and [...] built on a foundation of trust, social networks, and knowledge exchange’.

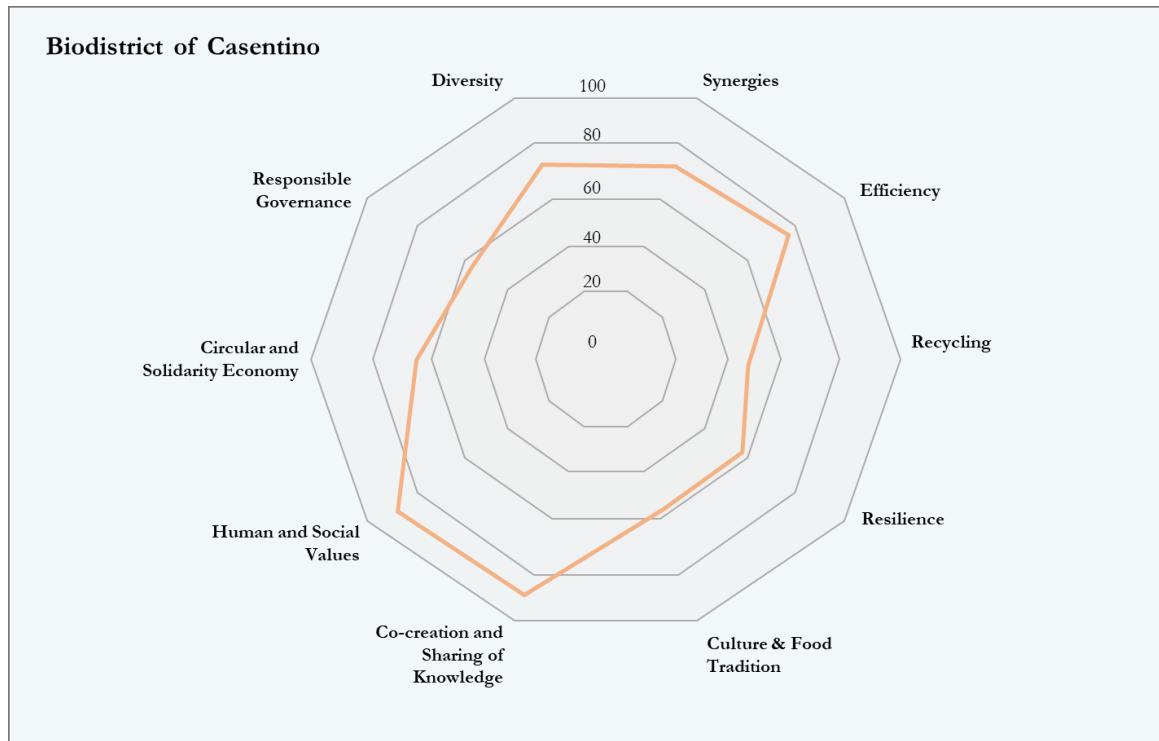


Figure 22: Results of the CAET (Step 1) from the analysis of the farms members of the biodistrict of Casentino. Source: data collected from the author through direct interviews and desk research.

As can be seen from Figure 22, the biodistrict of Casentino is overall performing quite well across all the section of the agroecology score, with distinctively good performances especially in the areas of Co-Creation and Sharing of Knowledge and Human and Social Values. This is in line with the other two biodistricts analysed and, in general, it confirms the fact that the biodistrict provides a valuable space for different stakeholders of the community to gather, cooperate and plan for a sustainable development of the local territory. The members of the biodistrict are all focusing greatly on achieving local gender equality and high-quality labour conditions, while also working together on reducing social inequalities. In this case, agribusiness is not present in the territory to the extent present in other areas of Tuscany, and this means there are more transparent supply

¹⁹ <https://www.ifoam.bio/our-work/how/standards-certification/participatory-guarantee-systems>

chains, smaller sizes of farms and higher integration between farmers and employees. Also, all the farms which are focusing on husbandry make sure to treat animals with a focus on their welfare and wellbeing. The interviewees (the president of the biodistrict and the local agronomist) made clear that, although some farms are run by younger generations of farmers, in general youth empowerment is still an area of improvement: most young people at local level do not wish to emigrate, but for this to happen economic and social conditions within the community need to be made better, e.g., by providing greater access to local markets for the local produce and/or by providing easier access to financial help for investments in agricultural assets and tools.

The farmers, members of the biodistrict, are excelling in their level of Efficiency (overall score of 78%) in the use of resources and in their management of soil fertility and pest/diseases. In fact, all the farmers present in the biodistrict are making sure that no synthetic fertiliser is used, and that the soil fertility is completely managed through organic practices (verified either through the use of standard EU organic certificates or through the use of the PGS). Along with this, all farmers are using only biological substances for the management of pests and diseases (of plants and animals), and they are making sure to adopt (and share among them) prevention measures in order to make sure the higher standards in organic agriculture are maintained. The interviewee highlighted how the biodistrict should improve its use of external inputs needed for production, since energy, fuel, fertilizers, and seeds (among others) are, in a great part, bought on the market: there is ample space of improvement for a greater level of exchange among farmers and the wider community, in order to build a proper agroecological system also regarding the use of external inputs.

The biodistrict has also done a great work over the years in reaching high levels of Synergies, measured through the integration of crops, livestock and aquaculture, the management of soil/plants systems, and the integration among the different elements of the agroecosystems (e.g., trees and pastoralism, trees and crops, etc.). In general, the area of Casentino is full of several species of trees and there is complete integration with the activities within farms: many trees provide several products (e.g., timber, fruits, and forage) and services (e.g., increased soil fertility, water retention and barrier to soil erosion), with the farmers aiming to reach high levels of agroforestry and silvo-pastoralism when animals are present.

In line with other biodistricts, the biodistrict of Casentino needs to improve its levels of Recycling. Among the farmers, the levels of renewable energy use and production is relatively low: in fact, the majority of the energy is purchased from the market and usually only a small amount is self-produced within the farms. In line with this, although residues and by-products are recycled (e.g., crops residues are used as animal feed, manure is used as fertilizer, compost is produced from manure and household waste), there is still a certain amount which goes to waste and the sorting rates across the territory of Casentino are low when compared to other areas in Tuscany (see section 2 of this chapter).

Although the level of Circular and Solidarity Economy for the biodistrict is not low, it can improve (score of 63%). In fact, although some networks of producers for marketing agricultural production exist, they are still working only occasionally: there has been several discussions among the members of the biodistrict to build a common brand to market the produce of the valley

producers on the external markets, but talks have always fall short of an actual agreement on practical steps to make this happen. The farmers are collaborating logically when they participate in farmers' markets in bigger cities (e.g., La Fierucola market in Florence), but they have not managed to collaborate on other levels. At the same time, locally the biodistrict has been extremely active in the development of a periodic local farmers' market held in one of the local administrations, thus offering a space of local market access to the biodistricts' members (farmers and consumers), but the arrangement can certainly improve both in intensity and frequency.

The same goes for the Responsible Governance, where community-level governance can definitely be improved, also through a better and more coordinated collaboration with other stakeholders within the territory. The biodistrict in the early years did not have a stable and fruitful relationship with the local administrations but this has changed lately, thanks to a new strategy and new direction which has started with the set-up of the local farmers' market. With a better interaction with the local administrations the biodistrict can aim at developing mechanisms for a higher participation of farmers and members in the governance of local land and natural resources, always with the sustainable development aims in sight.

In general, the biodistrict, with a total average score of 68%, can be considered a system with an advanced transition to agroecology. Its relatively small size compared to other biodistricts, its rural landscape, and the relatively smaller size of its producers might have favoured an easier implementation of sustainable goals within agricultural practices and higher levels of collaboration across the years. This, coupled with a high diversification of crops production, makes the biodistrict of Casentino excel in many of the topics addressed by the FAO CAET-TAPE framework. The biodistrict though has still many areas of improvement: the most important, it is the collaboration with the local administrations, which is key to develop a well-structured local market for local producers and to bridge the gap between consumers and farmers. Also, the collaboration with the local administrations will be key in a future institutionalization of the biodistrict (currently an association) under the regional law of Tuscany.

3.3. Preliminary conclusions

The main contribution of this chapter is to bring further clarity on the characterization of territories which might support the creation of biodistricts, and to provide additional understanding of biodistricts as meso-spaces of transformation at local level, where grassroots actors and institutional actors can interact and create a more sustainable food system. Moreover, this chapter started to answer the question on whether biodistricts as meso-spaces are maintaining and promoting sustainable development at local level.

General conclusions and considerations can be drawn from the analysis. First, by analysing the territories where 8 biodistricts in Tuscany are active, I have shown that all territories have different characteristics which define them, but a general statement encompassing all of them cannot be drawn. There is a high percentage of organic production in all territories where biodistricts are present, and this high percentage was already high before the set-up of the biodistrict: therefore, it seems that biodistricts were set-up in territories and municipalities where organic production was already important. The growth of organic production has then remained stable over the years,

in line with the overall trend in the region. The size of organic producers, on the other hand, varies according to the territory under analysis: in fact, the four territories with smaller producers are also the ones which saw the development of biodistricts at an earlier stage, compared to biodistricts with bigger producers. In general, all the other characteristics under analysis (e.g., number of associations, photovoltaic production, waste sorting, etc.) do not seem to affect the propensity of a territory to form a biodistrict or not.

Having in mind that the heterogeneity of the structures and the diverse characteristics and activities of biodistricts change according to the geographical and cultural contexts where they are created, section three has nonetheless aimed at further consolidating the characteristics of a biodistrict as meso-space of transformation by drawing some conclusions thanks to the additional information gathered through results from the questionnaires sent to all the active Italian biodistricts and thanks to ad-hoc interviews held to further clarify specific topics of discussion. Taking into consideration the difference among biodistricts in the involvement of actors, their dynamics and characteristics, there are certainly some factors which are influencing the possibility of the biodistrict to become a relevant meso-space of transformation at territorial level: the section has aimed at creating a blueprint for biodistricts as meso-spaces of transformation across their maturity phases (set-up, development, consolidation), firstly by giving three successful examples of biodistricts (Trento, Via Amerina e delle Forre, Val di Vara), and then by showing that while the presence of organic producers is essential in the initial phases of the biodistricts' activities, the administrations should be involved right after the first activities, with the other stakeholders' presence optional until the institutionalization of a biodistrict, at which point all stakeholders (at grassroots and institutional level) should be involved. The blueprint also shows how the objectives, activities, and governance structure should evolve according to the maturity phases, starting from working on cohesion on simple objectives (e.g., collaboration on promotion of organic agriculture), all the way to the open and democratic collaboration with different stakeholders on diverse topics of sustainable development (e.g., social inclusion, agroecology, short food chains, etc.).

Finally, the section of the CAET-TAPE assessment shows that the biodistricts are performing quite well on agroecological transitions. Trento with a 66% overall score, Chianti with a 55% overall score, and Casentino with a 68% overall score are representing systems either with an incipient transition to agroecology (Chianti) or systems with an advanced transition to agroecology (Casentino and Trento). This confirms us that the biodistricts, with the participation of stakeholders which are conscious about and active within sustainability topics: the members within the analysed biodistricts and, in general, the biodistricts as communities are promoting agroecology, therefore going over the mere concept of organic agriculture, and they are bringing into the picture the concept of biodiversity, diversity of crops, socio-economic inclusion, and ecology. Biodistricts therefore seem to first maintain and, secondly, promote sustainable development at local level.

The biodistricts are first of all a solid base for the co-creation and sharing of knowledge on agroecological topics, and they thrive on and constantly improve human and social values, not only of the members within the biodistrict but on a larger level, thanks to events, seminars and

activities which are catalysing attention and participation from the wider community. In terms of integration of different activities, the biodistricts offer great examples of communities where members are not only producing different crops, products and services, but also doing so in an integrated way with the local landscape and environment, therefore making sure high levels of biodiversity are always considered and ecological values are respected. This is true also for the Chianti region, where, although the members are highly specialized in the production of a certain crop, they are still working and collaborating among them and with the local administrations to try diversifying the production (e.g., using empty lands for diversity of crops).

The results show that, irrespective of the participation of the local administrations, biodistricts are still representing virtuous examples of agroecological transitions. In fact, the farms and actors participating in the biodistricts have as their primary objective the promotion of sustainable agriculture and biodiversity, and the involvement of the administrations seems to be an additional (necessary) step to solidify the transformation at local level, by allowing the sustainable practices of farmers, consumers and citizens to be translated into concrete legislative municipal norms. During the interviews, the interviewees highlighted how they plan to work with the local administrations on developing and building a local circular economy, with more access to markets for local farmers, and improved links with consumers.

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Concluding remarks, policy implications and further research directions

Faced with increasing risks from climate change, food systems are in strong need to transition away from dominant industrial paradigms and move towards a more sustainable way of producing, distributing, and consuming food. One solution or one side alone, though, might not have the desired systemic change or might not capture the full complexity of food systems.

To go beyond two known criticisms of local food sustainable initiatives, i.e., to be rather small and to be developed outside policy frameworks and/or in stark opposition to current food systems, in this dissertation I have argued to look at governance spaces of transformation at local level where community members, professionals, and governments get together to share knowledge, deliberate, and collectively devise place-based strategies to address complex food systems issues.

To completely understand these spaces, I have thoroughly analysed ideas from sustainability transitions, environmental governance and sustainable food communities' literature (chapter 1), I have started the assessment of biodistricts as spaces of transformation of food systems at local level (chapter 2) and I have analysed the territories where biodistricts have been created, further investigating whether biodistricts can be considered as spaces of transformation of food systems, and assessing the degree of transition to agroecology of selected communities where biodistricts are present (chapter 3).

The emergence of new flexible forms of producer-consumer relationships and activities within the food sector has been documented for some time now (Giambartolomei et al., 2021) and it has been revealed how new policy networks are transforming the food governance landscape in urban and rural areas. An integrated and territorial mode of food governance (Wiskerke, 2009) is emerging as the new approach to bring together public actors, including local government representatives, with civil society organizations, which are to be connected towards new forms of food production and consumption and, in general, towards greater sustainability.

The inclusiveness of these governance arrangements is key for their success, as is their characterization as spaces of deliberation for sustainable transformations (Moragues-Faus and Morgan, 2015).

Given the strongly collaborative and participatory approach generally adopted by biodistricts, in this dissertation I have tried to prove that, at least in part, they provide spaces where it might be easier to find new ways to reach a broad cross-section of stakeholders, and to help devise agroecological transitions.

The focus on place-sensitive framings confirms the importance of recognising embedded places as key and active meso-level mediators (Sonnino et al., 2016): place here is the adequate level to converge and integrate the different actors, interests, knowledges and values attached to the food sustainability transformations. With public decision making shifting towards involving broader society and moving from centre, e.g., state level, to the periphery, e.g., sub-national levels (Piattoni, 2010), biodistricts are still conceptually unclear: it is not yet agreed in what terms to describe the phenomenon, but, in this dissertation, I can certainly say that they foster the participation of private

actors and other non-elected bodies in decision-making towards devising plans for greater sustainability of food systems.

Therefore, biodistricts, and in general governance spaces of transformation, could serve as a bridge to help societies and territories build a civic and institutional conversation around the sustainability of food systems. The adoption and dissemination of biodistricts could be only a first, but necessary and solid, step in the complex journey towards more sustainable, equitable and inclusive food systems and governance mechanisms.

In the second chapter I verified whether biodistricts could be considered as spaces for transformation of food systems at local level, therefore fostering scaling-up and scaling-out towards sustainability. The chapter used 8 case studies from the Tuscany region in Italy. By analysing and disentangling the actors, governance rules, and dynamics within selected cases in Tuscany, the chapter aimed at better defining what could really be a space of transformation and started to touch upon which characteristics, ethnography, culture and social traits would make certain biodistricts better candidates for being actors of change within the food and, in general, economic systems.

In general, the interviews showed how certain characteristics are more important than others for considering the biodistrict as a true spaces of transformation, able and capable of having an impact at territorial level. Based on the evidence collected, it is possible to state that the challenge of biodistricts as associations in being considered as spaces for transformation of food systems and as contributors to a sustainable development of the local territory is not yet complete, but it has gotten off to a good start.

In the third chapter I analysed the territories where biodistricts have been created, to further investigate whether biodistricts could be considered as spaces of transformation of food systems, and to assess the degree of transition to agroecology of selected communities where biodistricts are present.

The aim was to generate solid and harmonized evidence on the impact of biodistricts on key sustainability characteristics, such as a biodiverse environment, inclusive societal and cultural values, sustainable economic development, sound governance systems and organic, regenerative agricultural practices. The results allowed to develop idealtypes for biodistricts as spaces of transformation, showing how the presence of actors, the objectives, activities, and governance structures should evolve according to the maturity phases. Moreover, the application of CAET-TAPE assessment shows that the selected biodistricts are performing solidly on agroecological transitions.

Following along the guiding question, the thesis has disentangled this complex issue by looking at several topics and by trying to answer the following questions:

1. How can territorial spaces of transformation be conceptualized?
2. To what extent can biodistricts become territorial spaces of transformation for food systems?
3. How do biodistricts co-evolve?

- a. What is the role of territories in the emergence of biodistricts?
- b. What is the observed impact of biodistricts on the transition of territories towards agroecology?

This doctoral dissertation aimed at reaching three objectives:

1. provide further clarification to the concept of spaces of transformation for sustainability and biodistricts;
2. provide insights on dynamics, actors and impact of biodistricts as meso-spaces at territorial level for the sustainable transformation of food systems;
3. provide the instruments of dissemination of meso-spaces of transformation for the inclusion of grassroots and institutional actors, taking inspiration from, but not stopping at, biodistricts.

Further research is needed first of all to better understand the actors and dynamics of the spaces of transformation for sustainable food systems, with, e.g., an analysis of European biodistricts or experiences which might be similar, such as, for example, Food Policy Councils at different formation and development phases, and city-region food communities. Secondly, research is needed to investigate amplification processes, together with their interactions and consequences at territorial level: it is important, in my opinion, to know which combinations (i.e. which processes together) and sequences (i.e., which processes when in time) of processes are most supportive for successful transformations which can, subsequently, help initiatives to amplify their impact. Researchers should investigate what are the characteristics needed for better designing new urban and/or rural initiatives, with a strong amplification purpose in mind. Moreover, investigating consequences of processes, such as long term and cross-scale (e.g., institutional, temporal, spatial, etc.), could provide the proper information for policymakers for predicting (un-)anticipated and (un-)desired outcomes.

Researchers could also investigate which skills and agency actors are needed by territories to reach successful sustainability transitions of food systems, to pursue amplification processes and to build up on social innovation for future sustainable development. This would allow policymakers also to plan for mid and long-term plans of skills, knowledge and competency development at local level for citizens, consumers, labour and entrepreneurs. Example of skills could be cultural, political, or entrepreneurial skills (e.g. visioning, identifying windows of opportunity, coalition forming, etc.). Also, further research could be directed towards understanding whether other experiences (e.g., FPCs) could be considered as meso-spaces: understand the level of involvement of actors and stakeholders in the activities, the objectives of the FPCs and the impact towards more sustainable food systems (e.g., transition to agroecology).

Finally, further research could explore scalar considerations regarding local vs. regional, for example understanding when it is advantageous to work closely with local/regional government and when, instead, biodistricts would benefit from greater autonomy and informal influence to reach a successful sustainable transformation at local level.

To conclude, this thesis showed a growing evidence over the importance of the territorial scale for the sustainability transitions of food systems, and it showed how successful dynamic relationships

between actors, institutions, systems and policies need some form of coordination, which can be offered by governance spaces at local level such as biodistricts.

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Acknowledgements

To be completed.

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Annexes

ANNEX A – Questionnaire for characterization of Italian biodistricts. Sent to 23 biodistricts. Responses: 18.

1. Which were the motivations behind the creation of the biodistrict? (possibility of selecting more than one answer)
 - a. Promotion of sustainable development
 - b. Promotion of organic agriculture
 - c. Shortening gap between consumers, producers, and institutions
 - d. Safeguarding of biodiversity
 - e. Access to financing
 - f. Other
2. Which actors started the initiative? (possibility of selecting more than one answer)
 - a. Organic producers
 - b. Local administrations and institutions
 - c. Local associations (consumer groups or similar)
 - d. AIAB (Italian association of organic agriculture)

- e. Other
3. Which actors are today the most active in the planning and implementation of activities? (possibility of selecting more than one answer)
- a. Organic producers
 - b. Local associations
 - c. Local administrations
 - d. Citizens
 - e. AIAB
 - f. Other
4. What is the level of participation and commitment of organic producers? (choose one of the answers)
- a. High representation of the territory and participation to the activities
 - b. High representation but medium/low participation
 - c. Medium/low representation and high participation
 - d. Medium/low representation and medium/low participation
5. What is the level of participation of local associations and consumers to the activities of the biodistrict? (choose one of the answers)
- a. Inconsistent participation
 - b. High participation in planning and management of activities
 - c. Low participation
 - d. Other
6. How are the relations and interactions with the local administrations (choose one of the answers)
- a. Constant dialogue, with convergence on sustainable themes, but no concrete legal acts
 - b. Dialogue with administrations with concrete legal acts on the territory
 - c. Participation of administration's representatives to the activities of the biodistrict
 - d. No dialogue
7. How are the assemblies and the governance structure? (choose one of the answers)
- a. Assemblies with low participation, but high consensus
 - b. Assemblies strongly participated and high consensus
 - c. Assemblies participated with disagreements
 - d. Low participation with disagreements
8. Are there specific characteristics of the territory which in your opinion might have favoured the creation of the biodistrict? (possibility of selecting more than one answer)
- a. Strong efforts from the local community to safeguard biodiversity and ecology, also in response to industrialization and conventional agriculture
 - b. Strong presence of organic agriculture
 - c. Attention of local community to sustainable development objectives
 - d. Strong presence of virtuous local administrations

9. What is the impact on the territory of the activities of the biodistrict? (possibility of selecting more than one answer)
 - a. Sharing of good practices and ideas between members of the biodistrict, especially concerning sustainable development and environmental issues
 - b. Increase of matching between demand and supply of local products
 - c. Increase of social cohesion and consensus on sustainable objectives
 - d. Improved education and consciousness on dietary and food issues among citizens and consumers
 - e. Increase of organic agriculture
 - f. Concrete legal acts after constructive dialogue between biodistrict and institutions
10. If you had to choose between the following statements regarding your biodistrict, which one would you choose?
 - a. The objective of a biodistrict is to create a space where producers, consumers, citizens, and institutions can dialogue and discuss to find solutions for the sustainable transformation of food systems
 - b. The biodistrict has objectives of promotion of the territory and increase of responsible tourism
 - c. The biodistrict has the objective of shortening the food chain
 - d. The biodistrict is a first step for the creation of a legally recognized territorial governance instrument
 - e. The biodistrict has political objectives, like an increase of social inclusion and improvement of labour conditions
 - f. The biodistrict has the objective of promoting organic agriculture

ANNEX B – FAO TAPE-CAET questionnaire applied to 3 selected case studies.

1. DIVERSITY

- a. CROPS
 - i. 0 - Monoculture (or no crops cultivated).
 - ii. 1 - One crop covering more than 80 percent of cultivated area.
 - iii. 2 – Two or three crops with significant cultivated area.
 - iv. 3 - More than 3 crops with significant cultivated area adapted to local and changing climatic conditions.
 - v. 4 - More than 3 crops of different varieties adapted to local conditions and spatially diversified farm with multi-, poly- or inter-cropping.
- b. ANIMALS (INCLUDING FISH AND INSECTS)
 - i. 0 - No animals raised.
 - ii. 1 - One species only.
 - iii. 2 - Two or three species, with few animals.
 - iv. 3 – More than three species with significant number of animals.
 - v. 4 – More than three species with different breeds well adapted to local and changing climatic conditions.

- c. TREES (AND OTHER PERENNIALS)
 - i. 0 - No trees (nor other perennials).
 - ii. 1 - Few trees (and/or other perennials) of one species only.
 - iii. 2 - Some trees (and/or other perennials) of more than one species.
 - iv. 3 - Significant number of trees (and/or other perennials) of different species.
 - v. 4 - High number of trees (and/or other perennials) of different species integrated within the farm land.
- d. DIVERSITY OF ACTIVITIES, PRODUCTS AND SERVICES
 - i. 0 - One productive activity only (e.g. selling one crop only).
 - ii. 1 - Two or three productive activities (e.g. selling 2 crops or one crop and one type of animals).
 - iii. 2 - More than 3 productive activities.
 - iv. 3 - More than 3 productive activities and one service (e.g. processing products on the farm, ecotourism, transport of agricultural goods, training etc.).
 - v. 4 - More than 3 productive activities, and several services.

2. SYNERGIES

- a. CROP-LIVESTOCK-AQUACULTURE INTEGRATION
 - i. 0 - No integration: animals, including fish, are fed with purchased feed and their manure is not used for soil fertility; or no animal in the agroecosystem.
 - ii. 1 - Low integration: animals are mostly fed with purchased feed, their manure is used as fertilizer.
 - iii. 2 - Medium integration: animals are mostly fed with feed produced on the farm and/or grazing, their manure is used as fertilizer.
 - iv. 3 - High integration: animals are mostly fed with feed produced on the farm, crop residues and by-products and/or grazing, their manure is used as fertilizer and they provide traction.
 - v. 4 - Complete integration: animals are exclusively fed with feed produced on the farm, crop residues and by-products and/or grazing, all their manure is recycled as fertilizer and they provide more than one service (food, products, traction, etc.).
- b. SOIL-PLANTS SYSTEM MANAGEMENT
 - i. 0 - Soil is bare after harvest. No intercropping. No crop rotations (or rotational grazing systems). Heavy soil disturbance (biological, chemical or mechanical).
 - ii. 1 - Less than 20 percent of the arable land is covered with residues or cover crops. More than 80 percent of the crops are produced in mono and continuous cropping (or no rotational grazing).
 - iii. 2 - 50 percent of soil is covered with residues or cover crops. Some crops are rotated or intercropped (or some rotational grazing is carried out).

- iv. 3 - More than 80 percent of soil is covered with residues or cover crops. Crops are rotated regularly or intercropped (or rotational grazing is systematic). Soil disturbance is minimized.
- v. 4 - All the soil is covered with residues or cover crops. Crops are rotated regularly and intercropping is common (or rotational grazing is systematic). Little or no soil disturbance.
- c. INTEGRATION WITH TREES (AGROFORESTRY, SILVOPASTORALISM, AGROSILVOPASTORALISM)
 - i. 0 - No integration: trees (and other perennials) don't have a role for humans or in crop or animal production.
 - ii. 1 - Low integration: small number of trees (and other perennials) only provide one product (e.g. fruits, timber, forage, medicinal or biopesticides substances...) or service (e.g. shade for animals, increased soil fertility, water retention, barrier to soil erosion...) for humans crops and/or animals.
 - iii. 2 - Medium integration: significant number of trees (and other perennials) provide at least one product or service.
 - iv. 3 - High integration: significant number of trees (and other perennials) provide several products and services.
 - v. 4 - Complete integration: many trees (and other perennials) provide several products and services.
- d. CONNECTIVITY BETWEEN ELEMENTS OF THE AGROECOSYSTEM AND THE LANDSCAPE
 - i. 0 - No connectivity: high uniformity within and outside the agroecosystem, no semi-natural environments, no zones of ecological compensation.
 - ii. 1 - Low connectivity: a few isolated elements can be found in the agroecosystem, such as trees, shrubs, natural fences, a pond or a small zone of ecological compensation.
 - iii. 2 - Medium connectivity: several elements are adjacent to crops and/or pastures or a large zone of ecological compensation.
 - iv. 3 - Significant connectivity: several elements can be found in between plots of crops and/ or pastures or several zones of ecological compensation (trees, shrubs, natural vegetation, pastures, hedges, channels, etc.).
 - v. 4 - High connectivity: the agroecosystem presents a mosaic and diversified landscape, many elements such as trees, shrubs, fences or ponds can be found in between each plot of cropland or pasture, or several zones of ecological compensation.

3. EFFICIENCY

- a. USE OF EXTERNAL INPUTS
 - i. 0 - All inputs are purchased from the market.
 - ii. 1 - The majority of the inputs is purchased from the market.
 - iii. 2 - Some inputs are produced on farm/within the agroecosystem or exchanged with other members of the community.

iv. 3 - The majority of the inputs is produced on farm/within the agroecosystem or exchanged with other members of the community.

v. 4 - All inputs are produced on farm/within the agroecosystem or exchanged with other members of the community.

b. MANAGEMENT OF SOIL FERTILITY

i. 0 - Synthetic fertilisers are used regularly on all crops and/or grasslands (or no fertilizers are used for lack of access, but no other management system is used).

ii. 1 - Synthetic fertilizers are used regularly on most crops and some organic practices (e.g. manure or compost) are applied to some crops and/or grasslands.

iii. 2 - Synthetic fertilisers are used on a few specific crop only. Organic practices are applied to the other crops and/or grasslands.

iv. 3 - Synthetic fertilisers are only used exceptionally. A variety of organic practices are the norm.

v. 4 - No synthetic fertilisers are used, soil fertility is managed only through a variety of organic practices.

c. MANAGEMENT OF PESTS & DISEASES

i. 0 - Chemical pesticides and drugs are used regularly for pest and diseases management. No other management is used.

ii. 1 - Chemical pesticides and drugs are used for a specific crop/animal only. Some biological substances and organic practices are applied sporadically.

iii. 2 - Pests and diseases are managed through organic practices but chemical pesticides are used only in specific and very limited cases.

iv. 3 - No chemical pesticides and drugs are used. Biological substances are the norm.

v. 4 - No chemical pesticides and drugs are used. Pests and diseases are managed through a variety of biological substances and prevention measures.

d. PRODUCTIVITY AND HOUSEHOLD'S NEEDS

i. 0 - Household's needs are not met for food nor for other essentials.

ii. 1 - Production covers only household's needs for food. No surplus to generate income.

iii. 2 - Production covers household's needs for food and surplus generates cash to buy essentials but doesn't allow savings.

iv. 3 - Production covers household's needs for food and surplus generates cash to buy essentials and to have sporadic savings.

v. 4 - All household's needs are met both for food and for cash to buy all essentials needed and to have regular savings.

4. RECYCLING

a. RECYCLING OF BIOMASS AND NUTRIENTS

i. 0 - Residues and by-products are not recycled (e.g. left for decomposition or burnt). Large amounts of waste are discharged or burnt.

- ii. 1 - A small part of the residues and by-products is recycled (e.g. crop residues as animal feed, use of manure as fertilizer, production of compost from manure and household waste, green manure). Waste is discharged or burnt.
 - iii. 2 - More than half of the residues and by-products is recycled. Some waste is discharged or burnt.
 - iv. 3 - Most of the residues and by-products are recycled. Only a little waste is discharged or burnt.
 - v. 4 - All of the residues and by-products are recycled. No waste is discharged or burnt.
- b. WATER SAVING
- i. 0 - No equipment nor techniques for water harvesting or saving.
 - ii. 1 - One type of equipment for water harvesting or saving (e.g. drip irrigation, tank).
 - iii. 2 - One type of equipment for water harvesting or saving and use of one practice to limit water use (e.g. timing irrigation, cover crops).
 - iv. 3 - One type of equipment for water harvesting or saving and various practices to limit water use.
 - v. 4 - Several types of equipment for water harvesting or saving and various practices to limit water use.
- c. MANAGEMENT OF SEEDS AND BREEDS
- i. 0 - All seeds and/or animal genetic resources (e.g. chicks, young animals, semen) are purchased from the market.
 - ii. 1 - More than 80 percent of seeds/animal genetic resources are purchased from the market.
 - iii. 2 - About half of the seeds are self-produced or exchanged, the other half is purchased from the market. About half of the breeding is done with neighbouring farms.
 - iv. 3 - The majority of seeds/animal genetic resources are self-produced or exchanged. Some specific seeds are purchased from the market.
 - v. 4 - All seeds/animal genetic resources are self-produced, exchanged with other farmers or managed collectively, ensuring enough renewal and diversity.
- d. RENEWABLE ENERGY USE AND PRODUCTION
- i. 0 - No renewable energy is used nor produced.
 - ii. 1 - The majority of the energy is purchased from the market. A small amount is self-produced (animal traction, wind, turbine, hydraulic, biogas, wood...).
 - iii. 2 - Half of the energy used is self-produced, the other half is purchased.
 - iv. 3 - Significant production of renewable energy, negligible use of fuel and other non-renewable sources

- v. 4 - All of the energy used is renewable and/or self-produced. Household is self-sufficient for energy supply, which is guaranteed at every time. Use of fossil fuel is negligible.

5. RESILIENCE

a. STABILITY OF INCOME/PRODUCTION AND CAPACITY TO RECOVER FROM PERTURBATIONS

- i. 0 - Income is decreasing year after year, production is highly variable despite constant level of input and there is no capacity to recover after shocks/perturbations.
- ii. 1 - Income is on decreasing trend, production is variable from year to year (with constant inputs) and there is little capacity to recover after shocks/perturbations.
- iii. 2 - Income is overall stable, but production is variable from year to year (with constant inputs). Income and production mostly recover after shocks/perturbations.
- iv. 3 - Income is stable and production varies little from year to year (with constant inputs). Income and production mostly recover after shocks/perturbations.
- v. 4 - Income and production are stable and increasing over time. They fully and quickly recover after shocks/perturbations.

b. MECHANISMS TO REDUCE VULNERABILITY

- i. 0 - No access to credit, no insurance, no community support mechanisms.
- ii. 1 - Community is not very supportive and its capacity to help after shocks is very limited. And/ or access to credit and insurance is limited.
- iii. 2 - Community is supportive but its capacity to help after shocks is limited. And/or access to credit is available but hard to obtain in practice. Insurance is rare and does not allow for complete coverage from risks.
- iv. 3 - Community is very supportive for both men and women but its capacity to help after shocks is limited. And/or access to credit is available and insurance covers only specific products/risks.
- v. 4 - Community is highly supportive for both men and women and can significantly help after shocks. And/or access to credit is almost systematic and insurance covers most of production.

c. INDEBTEDNESS

- i. 0 - Debt is higher than income.
- ii. 1 - Debt is more than half of the income. Capacity to reimburse is limited.
- iii. 2 - Debt is approximately half of the income.
- iv. 3 - Debt is limited and capacity to reimburse is total.
- v. 4 - No debt.

6. CULTURE & FOOD TRADITION

a. APPROPRIATE DIET AND NUTRITION AWARENESS

- i. 0 - Systematic insufficient food to meet nutritional needs and lack of awareness of good nutritional practices.

- ii. 1 - Periodic insufficient food to meet nutritional needs and/or diet is based on a limited number of food groups. Lack of awareness of good nutritional practices.
 - iii. 2 - Overall food security over time, but insufficient diversity in food groups. Good nutritional practices are known but not always enforced.
 - iv. 3 - Food is sufficient and diverse. Good nutritional practices are known but not always enforced.
 - v. 4 - Healthy, nutritious, diversified diet. Good nutritional practices are well known and enforced.
- b. LOCAL OR TRADITIONAL (PEASANT / INDIGENOUS) IDENTITY AND AWARENESS
- i. 0 - No local or traditional (peasant / indigenous) identity felt.
 - ii. 1 - Little awareness of local or traditional identity.
 - iii. 2 - Local or traditional identity felt in part, or that concerns only part of the household.
 - iv. 3 - Good awareness of local or traditional identity and respect of traditions or rituals overall.
 - v. 4 - Local or traditional identity strongly felt and protected, high respect for traditions and/or rituals.
- c. USE OF LOCAL VARIETIES/BREEDS AND TRADITIONAL (PEASANT & INDIGENOUS) KNOWLEDGE FOR FOOD PREPARATION
- i. 0 - No use of local varieties/breeds nor traditional knowledge for food preparation.
 - ii. 1 – A majority of exotic/introduced varieties/breeds are consumed, or there is little use of traditional knowledge and practices for food preparation.
 - iii. 2 - Both local and exotic/introduced varieties/breeds are produced and consumed. Local or traditional knowledge and practices for food preparation are identified but not always applied.
 - iv. 3 – The majority of the food consumed comes from local varieties/breeds and traditional knowledge and practices for food preparation are implemented.
 - v. 4 – A number of local varieties/breeds are produced and consumed. Traditional knowledge and practices for food preparation are identified, applied and recognised in official frameworks and/or specific events.

7. CO-CREATION & SHARING OF KNOWLEDGE

- a. PLATFORMS FOR THE HORIZONTAL CREATION AND TRANSFER OF KNOWLEDGE AND GOOD PRACTICES
- i. 0 - No platforms for co-creation and transfer of knowledge are available to producers.
 - ii. 1 - At least one platform for the co-creation and transfer of knowledge exists but does not function well and/or is not used in practices.

- iii. 2 - At least one platform for the co-creation and transfer of knowledge exists and is functioning but is not used to share knowledge on agroecology specifically.
 - iv. 3 – One or several platforms for the co-creation and transfer of knowledge exist, are functioning and are used to share knowledge on agroecology, including women.
 - v. 4 – Several well established and functioning platforms for the co-creation and transfer of knowledge are available and widespread within the community, including women.
- b. ACCESS TO AGROECOLOGICAL KNOWLEDGE AND INTEREST OF PRODUCERS IN AGROECOLOGY
- i. 0 - Lack of access to agroecological knowledge: principles of agroecology are unknown to producers.
 - ii. 1 - Principles of agroecology are mostly unknown to producers and/or there is little trust in them.
 - iii. 2 - Some agroecological principles are known to producers and there is interest in spreading the innovation, facilitating knowledge sharing within and between communities and involving younger generations.
 - iv. 3 – Agroecology is well known and producers are willing to implement innovations, facilitating knowledge sharing within and between communities and involving younger generations, including women and younger generations.
 - v. 4 - Widespread access to agroecological knowledge of both men and women: producers are well aware of the principles of agroecology and eager to apply them, facilitating knowledge sharing within and between communities and involving younger generations.
- c. PARTICIPATION OF PRODUCERS IN NETWORKS AND GRASSROOT ORGANIZATIONS
- i. 0 - Producers are isolated, have almost no relations with their local community and do not participate in meetings and grass-root organisations.
 - ii. 1 - Producers have sporadic relations with their local community and rarely participate in meetings and grass-root organisations.
 - iii. 2 - Producers have regular relations with their local community and sometimes participate in the events of their grass-root organisations but not as much for women.
 - iv. 3 - Producers are well interconnected with their local community and often participate in the events of their grass-root organisations, including women.
 - v. 4 - Producers (with equal participation of men and women) are highly interconnected and supportive and show a very high engagement and participation in all the events of their local community and grass-root organisations.

8. HUMAN & SOCIAL VALUES

a. WOMEN'S EMPOWERMENT

- i. 0 - Women do not normally have a voice in decision making, not in the household nor in the community. No organisation for women empowerment exists.
- ii. 1 - Women may have a voice in their household but not in the community. And/or one form of women association exist but is not fully functional.
- iii. 2 - Women can influence decision making, both at household and community level, but are not decision makers. They don't have access to resources. And/or some forms of women associations exist but are not fully functional.
- iv. 3 - Women take fully part in decision making processes but still don't have full access to resources. And/or women organisations exist and are used.
- v. 4 - Women are completely empowered in terms of decision making and access to resources. And/or women organisations exist, are functional and operational.

b. LABOUR (PRODUCTIVE CONDITIONS, SOCIAL INEQUALITIES)

- i. 0 – Agricultural supply chains are integrated and managed by agribusiness. Social and economic distance between landowners and workers. And/or workers don't have decent working conditions, make low wages and are highly exposed to risks.
- ii. 1 – Working conditions are hard, workers have average wages for the local context and may be exposed to risks.
- iii. 2 - Agriculture is mostly based on family farming but producers have limited access to capital and decision-making processes. Workers have the minimum decent labour conditions.
- iv. 3 - Agriculture is mostly based on family farming and producers (both men and women) have access to capital and decision-making processes. Workers have decent labour conditions.
- v. 4 - Agriculture is based on family farmers which have full access to capital and decision-making processes in gender equity. Social and economic proximity between farmers and employees.

c. YOUTH EMPOWERMENT AND EMIGRATION

- i. 0 - Young people see no future in agriculture and are eager to emigrate.
- ii. 1 - Most young people think that agriculture is too hard and many wish to emigrate.
- iii. 2 - Most young people do not want to emigrate, despite hard working conditions, and wish to improve their livelihoods and living conditions within their community.
- iv. 3 - Most young people (both boys and girls) are satisfied with working conditions and do not want to emigrate.
- v. 4 - Young people (both boys and girls) see their future in agriculture and are eager to continue and improve the activity of their parents.

- d. ANIMAL WELFARE [IF APPLICABLE]
 - i. 0 - Animals suffer from hunger and thirst, stress and diseases all year long, and are slaughtered without avoiding unnecessary pain.
 - ii. 1 - Animals suffer periodically/seasonally from hunger and thirst, stress or diseases, and are slaughtered without avoiding unnecessary pain.
 - iii. 2 - Animals do not suffer from hunger or thirst, but suffer from stress, may be prone to diseases and can suffer from pain at slaughter.
 - iv. 3 - Animals do not suffer from hunger, thirst or diseases but can experience stress, especially at slaughter.
 - v. 4 - Animals do not suffer from stress, hunger, thirst, pain, or diseases, and are slaughtered in a way to avoid unnecessary pain.

9. CIRCULAR & SOLIDARITY ECONOMY

- a. PRODUCTS AND SERVICES MARKETED LOCALLY
 - i. 0 - No product/service is marketed locally (or not enough surplus produced), or no local market exist.
 - ii. 1 - Local markets exist but hardly any of the products/services are marketed locally.
 - iii. 2 - Local markets exist. Some products/services are marketed locally.
 - iv. 3 - Most products/services are marketed locally.
 - v. 4 - All products and services are marketed locally.
- b. NETWORKS OF PRODUCERS, RELATIONSHIP WITH CONSUMERS AND PRESENCE OF INTERMEDIARIES
 - i. 0 - No networks of producers for marketing agricultural production exist. No relationship with consumers. Intermediaries manage the whole marketing process.
 - ii. 1 - Networks exist but do not work properly. Little relationship with consumers. Intermediaries manage most of the marketing process.
 - iii. 2 - Networks exist and are operational, but don't include women. Direct relationship with consumers exist. Intermediaries manage part of the marketing process.
 - iv. 3 - Networks exist and are operational, including women. Direct relationship with consumers exist. Intermediaries manage part of the marketing process.
 - v. 4 - Well established and operational networks exist with equal women participation. Strong and stable relationship with consumers. No intermediaries.
- c. LOCAL FOOD SYSTEM
 - i. 0 - Community is totally dependent from outside for purchasing food supply and agricultural inputs and for the marketing and processing of products.
 - ii. 1 - The majority of food supply and agricultural inputs are purchased from outside and products are processed and marketed outside the local

- community. Very few goods and services are exchanged/sold between local producers.
- iii. 2 – Food supply and inputs are purchased from outside the community and/or products are processed locally. Some goods and services are exchanged/sold between local producers.
 - iv. 3 – Equal shares of food supply and inputs are locally available and purchased from outside the community and products are processed locally. Exchanges/trade between producers are regular.
 - v. 4 - Community is almost completely self-sufficient for agricultural and food production. High level of exchange/trade of products and services between producers.

10. RESPONSIBLE GOVERNANCE

a. PRODUCERS' EMPOWERMENT

- i. 0 - Producers' rights are not respected. They have no bargaining power and lack the means to improve their livelihoods and develop their skills.
- ii. 1 - Producers' rights are recognised but not always respected. They have small bargaining power and little means to improve their livelihoods and/or to develop their skills.
- iii. 2 - Producers' rights are recognised and respected for both men and women. They have small bargaining power but are not stimulated to improve their livelihoods and/or to develop their skills.
- iv. 3 - Producers' rights are recognised and respected for both men and women. They have the capacity and the means to improve their livelihoods and are sometimes stimulated to develop their skills.
- v. 4 - Producers' rights are recognised and respected for both men and women. They have the capacity and the means to improve their livelihoods and to develop their skills.

b. PRODUCERS' ORGANIZATIONS AND ASSOCIATIONS

- i. 0 - Cooperation among producers is non-transparent, corrupted or non-existent. No existing organisation or they do not distribute profits transparently and/or equally nor do they support producers.
- ii. 1 – One organisation of producers exists but its role is marginal and support to producers limited to market access.
- iii. 2 - One organisation of producers exists and provides support to producers for market access and other services (e.g. information, capacity development, incentives...), but women don't have access.
- iv. 3 - One organisation of producers exists and provides support to producers for market access and other services with equal access to men and women.
- v. 4 – More than one organisation exist. They provide market access and other services, with equal access to men and women.

c. PARTICIPATION OF PRODUCERS IN GOVERNANCE OF LAND AND NATURAL RESOURCES

- d. 0 - Producers are completely excluded from the governance of land and natural resources. There is no gender equity in the governance of land and natural resources.
- e. 1 - Producers participate in the governance of land and natural resources but their influence on decisions is limited. Gender equity is not always respected.
- f. 2 - Mechanisms allowing producers to participate in the governance of land and natural resources exist but are not fully operational. Their influence on decisions is limited. Gender equity is not always respected.
- g. 3 - Mechanisms allowing producers to participate in the governance of land and natural resources exist and are fully operational. They can influence decisions. Gender equity is not always respected.
- h. 4 - Mechanisms allowing producers to participate in the governance of land and natural resources exist and are fully operational. Both women and men can influence decisions.

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