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The Role of Territorially Embedded Innovation Ecosystems Accelerating Sustainability Transformations: A Case Study of the Transformation to Organic Wine Production in Tuscany (Italy)

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Received: 21 April 2020; Accepted: 3 June 2020; Published: 5 June 2020



Abstract: Over the last few years, there has been a growing concern among academics and practitioners about the slow pace in which sustainability transformations unfold. While most socio-technical transformations tend to happen over extended periods, research shows that unless some dramatic changes are introduced, we are risking damaging the critical earth systems that sustain human life. In this context, understanding why and how transformations happen at a much faster pace in certain places than in others is of crucial importance. This paper investigates the rapid transformation of Panzano, from traditional wine production to organically produced wine. Using a combination of document analysis, participant observation, and face to face interviews in Panzano in 2019, this article examines the role of the territorially embedded innovation ecosystems facilitating this fast transformation. The study looks at place based-structural preconditions and different forms of agency at different stages in the transformation. Our findings illustrate that a place-based agency is paramount for accelerating sustainability transformations.

Keywords: innovation; ecosystem; organic wine; Tuscany

1. Introduction

In November 2018, the UN IPCC report indicated that profound transformations are needed before 2030 if we want to avert catastrophic environmental consequences, including the total loss of all coral reefs and a significant reduction of island communities [1]. A couple of months later, in April 2019, the UN launched the most comprehensive report on the state of world biodiversity and ecosystem services since the seminal Millennium Ecosystem Assessment [2]. The results of the three-year research project directly involving 150 scientists around the world were devastating. According to the report, two in five amphibian species are at risk of extinction, as one-third of reef-forming corals, and close to one-third of other marine species. In economic terms, the losses are jaw-dropping. Pollinator loss has put up to \$577bn (£440bn) of crop output at risk, while land degradation has reduced the productivity of 23% of global land [2]. With slightly more than ten years to go to the IPCC deadline, the need for accelerated system transformations has come to the forefront of political and academic debates [3–8].

However, we still know very little about if and how system transformations might be accelerated [9]. In fact, in the real world, long-term incremental system changes are the norm, partly due to the systemic nature of innovation. On the one hand, systems are path-dependent. Prior investments in technologies and the related human capital, infrastructure, institutional frameworks, and other sunk costs can

lock-in the system and prevent it from responding to radical changes [10]. On the other hand, science, technology, and innovation policies tend to focus on addressing failures in existing systems rather than changing them, thus perpetuating gradual change [8].

In contrast with the structuralist perspective, the literature on the governance of sustainability transformations has focused on the role of agency on the speed [11] and the directionality of the transformations [12]. According to this literature, the existence of protected spaces for experimentation or the role of intermediaries [13] can create new opportunities for transformation and affect the direction and speed of transformations. The literature has significantly contributed to our understanding of enabling factors supporting transformations and the role of agency. However, it has also received critiques, particularly from economic geographers, on the lack of attention to how innovative ecosystems embedded in particular territories, shape the speed and direction of transformations [14–16].

This paper aims to address this gap by looking at the role of territorially embedded innovation ecosystems (TEIE) in accelerated sustainability transformations. TEIEs belong to what Boyer (in this same special issue) calls the regional/local ecosystem approach, which highlights the territorial dynamics of the innovation process [17]. TEIE is an embracing concept that might include innovative clusters, industrial districts, or regional innovation systems. A more in-depth look into the role of structural preconditions and agency in the transformation of specific TEIE is essential for several reasons. On the one hand, structural preconditions differ significantly between different TEIEs. The economic structure of a region, its knowledge specialization, or its institutional frameworks are the results of historical processes of knowledge accumulation. The existence of shared institutional frameworks, strong networks, and a sense of place enable interactive learning and continuous innovation in TEIEs [18]. TEIEs are constructed relationally, through social capital and networks supporting the creation and exchange of knowledge [19]. It is in this respect that evolutionary economic geographers argue that history matters in regional transformations. In other words, the opportunities for transformation of particular TEIE are path-dependent [20].

On the other hand, the transformation capacity of particular territories can be shaped by particular forms of agency. Grillitch and Sotarauta suggest that different forms of agency can shape the opportunity space for transformation: entrepreneurial, institutional, and place-based. Regarding the latter, a strong sense of place [14] place frames [15] or place leadership [21] as a shared understanding of the identity of a place, and a shared vision of what that place might become, is crucial for transformations. Ecosystems, understood through this place-making lens, could potentially be a powerful mechanism for accelerating transformations.

While promising, this recent literature on agency and regional transformations remains at a rather general and theoretical level. It focuses on regional transformations in general, without paying specific attention to sustainability transformations as one specific transformation with a clear directionality [12]. Furthermore, for the current paper, there is a lack of studies analyzing how structural preconditions and agency in TEIEs affect the speed of transformation.

This paper aims at contributing to this gap in the literature. It investigates the role of the local innovation ecosystem in the rapid transformation of Panzano from traditional wine production to organically produced wine. Panzano is a county in Tuscany where the transition to organic wine has almost reached 100% of the territory in barely 25 years. This article investigates the role of place-based structural preconditions and different forms of agency in the transformation of the TEIE over time. The analysis allows us to identify which factors appear to be more significant at different stages in the transformation, from the incept to the acceleration and the consolidation. For instance, while structural preconditions and entrepreneurial agency are essential at the beginning of the transformation, it is place-based leadership that significantly contributes to the acceleration.

The paper is structured as follows. Section 2 discusses the concept of sustainability transformations and the determinants of its speed. We pay particular attention to the role of the specific territorial context in which these transformations emerge and deploy in shaping the speed and direction of transformations. Section 3 provides an overview of the methodology used for data gathering

and analysis. Section 4 expands the study of Panzano, investigating the drivers behind its fast transformations, and Section 5 concludes.

2. Literature Review

2.1. Sustainability Transformations

Over the last few years, there has been a growing concern among academics and practitioners about the slow pace in which sustainability transformations unfold [22]. Research shows that unless some dramatic changes are introduced in the following decade, we are risking damaging the critical earth systems in which human life on this planet is sustained [23,24]. In this context, understanding why and how transformations happen at a much faster pace in certain places than in others is of crucial importance.

In the context of this paper, we follow Roggema et al. [25] definition of sustainability transformations. Transformation is seen as a change towards a future that is fundamentally different from the current situation [3]. Incremental change, on the other hand, is seen as a slow process, with imperceptible changes, and a transition is seen as a fluent change towards an improved version of the current status, but where the current system is not fundamentally changed [26]. In this respect, only the term “transformation” would capture the radical and non-linear nature of system change [27]. The latter is also referred to in the literature as deep transitions [8,27]. The current paper adopts this later understanding of sustainability transformations as embracing substantial change from the previous situation, including changes in practices, routines, beliefs, and policies.

A key characteristic of sustainability transformations of the radical and deep kind discussed above is that they take time. System transformations require structural changes in current economic, social, political, and technological regimes and meta-regimes [28], implying profound transformations of the dominant techno-economic paradigm [29] and the reconfigurations of actors, their relationships [30], and the formal and informal institutions that influence their behavior. The structuralist approaches to sustainability transformations see them as path-dependent. Prior investments in technologies and the related human capital, infrastructure, institutional frameworks, and other sunk costs prevent systems from responding to radical changes [10]. Economic actors set up routines to reduce the uncertainty driven by their bounded rationality. Due to their tacit and cumulative nature, routines are not easy to change, and very difficult to imitate for other firms [31]. In other words, firms are subject to cognitive constraints [31] that hinder the process of change. At the same time, science, technology, and innovation policies tend to focus on addressing failures in existing systems rather than changing them, thus perpetuating gradual change [8]. As a result of these structural constraints, it is argued that transformations will take decades and even centuries to complete.

It is only recently that the role of agency in sustainability transformations has come explicitly to the forefront of academic discussions [8,11,32]. Within this emerging stream of literature, researchers look at the capacity of individuals and organizations to act independently and to make their own free choices [32–34] and create opportunities for change [35]. The main finding is that understanding agency, which is how different actors might strategically join forces in networks to achieve particular goals, is key to overcoming the structural system inertia to incremental change and realizing transformations [11].

Both structural preconditions and agency vary significantly between different territories, and economic geographers have criticized the current literature on sustainability transformations for their lip service to the analysis on how innovative ecosystems embedded in particular territories shape the speed and direction of transformations [16–18]. TEIEs matter because regions have accumulated different skills and knowledge, relations, and institutional frameworks over time. But also, as place-based leadership is paramount for sustainability transformations [35]. In other words, both structural preconditions and agency are related to, and embedded, in particular territorial innovation ecosystems, creating a particular sense of place. The extent to which TEIEs are important for understanding sustainability transformations will be discussed next.

2.2. Territorially Embedded Innovation Ecosystems and Sustainability Transformations

Economic geographers have long acknowledged the impact of territorially embedded ecosystems for innovation [36,37]. Firms and organizations closely located share network relations of (mainly) tacit and informal nature that are crucial for knowledge exchange. Geographical proximity also facilitates interaction between diverse and complementary capabilities [38,39] and a spatial neighbor effect conveyed through social interaction and visibility [40]. Firms can derive localized competitive advantages due to the joint and collective cumulative path of learning and coordination and close face to face interaction [41,42]. At the same time, informal control mechanisms, such as those exerted by social communities, are also powerful mechanisms to avoid free-riding [38].

In other words, innovation ecosystems are constructed relationally [19]. Moreover, those relations tend to happen with other organizations nearby. Place-making relations influence, and are influenced by, formal and informal institutions that are embedded in the territory [43]. Together, actors, relations, and institutions are the basis of a territorially embedded ecosystem.

It follows that the development of a particular ecosystem is path-dependent. The same relations, institutions, and actor configurations in the territory can act both as a promoter or deterrent of change. Similarly, the variety of knowledge present in one particular region affects the possibilities for path creation in that same region. Knowledge accumulates over time, and regions portray particular knowledge specializations. Thus, history matters in the transformative capacity of a particular TEIE, since it shapes the actors, network, and institutions of particular territories, as well as the knowledge base in which the innovation capacity of that particular territory is based.

While acknowledging the structural preconditions for the change of particular TEIEs, Grillitsch and Sotarauta [35] suggest that different forms of place-based agency can shape the capacity of a TEIE to transform. The authors propose to distinguish between three types of agency: Schumpeterian innovative entrepreneurship, institutional entrepreneurship, and place-leadership. Schumpeterian innovative entrepreneurship refers to attempts to break with existing growth paths through processes of Schumpeterian creative destruction, and it is observable through new ventures and new processes. Institutional entrepreneurship refers to individual and organizational attempts to change existing institutions, molding the rules of the game so that the Schumpeterian entrepreneurs can surface and succeed. Institutional entrepreneurship is observable through changes in rules and regulations. Finally, place leadership refers to “social processes involved in making things happen” [35]. Place leadership is the most difficult to observe due to its embeddedness in informal institutions. In the words of Sotarauta et al. [21] (p. 128), investigating place-based leadership is about revealing the types of social processes involved in “making things happen” and in “getting things done, more often than not, in an indirect manner”. How different forms of agency and structural preconditions shape the capacity of a TEIE to start, speed up, and consolidate sustainability transformations remains to be studied.

Identifying small-scale accelerated transformations and analyzing them could be a first step in understanding how sustainability transformations can be accelerated. We do so by looking at the fast transformation of a region in Tuscany–Panzano, from conventional to organic wine production at a much faster pace than the neighboring regions. In particular, we look at how the combination of structural characteristics and agency influences the speed of change.

3. Research Design

This paper uses case study research, which is suitable for the holistic, in-depth exploration and understanding of complex issues, such as sustainability transformations [44]. This approach will help to explain both the process and outcome of human-institution-forest interactions, through the observation, reconstruction, and analysis of the case study outlined below.

3.1. Selection of Case Study: Organic Wine Production in Panzano

The case was selected following a purposive sample procedure. Purposive sampling is recommended when the aim is to focus on particular characteristics that enable one to explain the research questions [45], in this case, how the innovation ecosystem enabled the fast transition of Panzano to organic wine production. The case was selected because of its extreme characteristics; that is, the fact that the sustainability transformation has taken place at a much more accelerated pace than in the overall region.

Panzano is located in the municipality of Greve in Chianti within the Tuscany region (Italy), between the two cities of Firenze and Siena (see Figure 1). The municipality of Greve in Chianti is included in the Chianti Classico region, which covers 71,800 hectares (177,500 acres) of territory, of which 10,000 hectares are devoted to wine production. The Chianti Classico region also includes the entire territories of the municipalities of Castellina in Chianti, Gaiole in Chianti and Radda in Chianti and parts of those of Barberino Tavarnelle, Castelnuovo Berardenga, Poggibonsi, and San Casciano Val di Pesa.

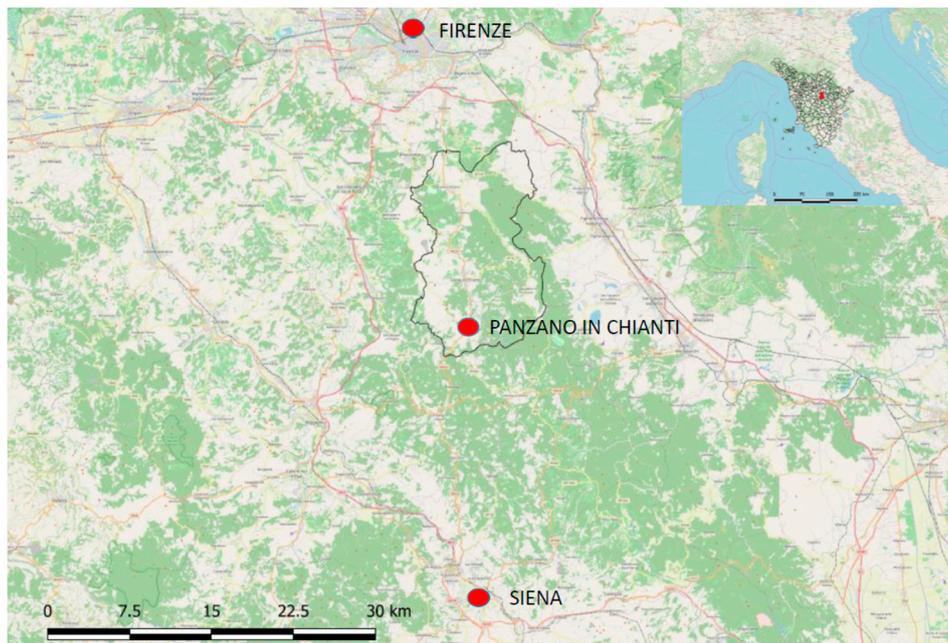


Figure 1. The location of Panzano in Chianti (the borders are the municipality of Greve in Chianti), within Tuscany and Italy (small frame with Tuscan municipality borders). (Source: self-elaboration with the use of Quantum GIS and Open Street Map).

Rows of vines alternating with olive orchards are a characteristic feature of the Chianti Classico landscape. About 7200 hectares (17,290 acres) of vineyards are part of the DOCG (Denominazione di Origine Controllata e Garantita), for the production of Chianti Classico, one of the most famous red wine in Italy and the world, as 80% of the production is exported worldwide. The Chianti Classico region has multiple sub-zones, some of which have formed unions or associations to promote their wines. Panzano is a sub-zone in the municipality of Greve in Chianti, and it represents 10% of the entire Chianti Classico territory.

The Chianti Classico organic production has since the year 2000 and now represents approximately 35% of the total wine production in the region. What differentiates Panzano from the regional trends towards organic production is twofold: the percentage of organic production vis à vis conventional production and the speed of the transformation to organic production. The latter is the particular focus of this paper.

3.2. Data Collection and Analysis

For the data collection and analysis, we use innovation biographies (IBs). IBs are a “valuable methodology to reflect the evolutionary character of the dynamics of the social initiatives’ and innovation processes in deepening the understanding of development paths, knowledge trajectories, and stakeholder interactions at the micro-level” [46] (p. 15). They are particularly useful for analyzing complex, emergent and non-linear events involving many actors across different levels [47].

In IBs, it is of paramount importance to use a combination of data collection techniques and sources to triangulate information, combining data from the individual and contextual level. Interviews constitute the individual level, as they reflect personal perspectives. Desk research using document analysis and participant observation enriches the biographic picture at the contextual level.

Primary data was collected through face to face semi-structured interviews conducted in 2018 to some wine producers in Panzano by both authors of this paper. The interviews were with the owners of the wineries and the local agronomist. The interviewees included all the key actors mentioned in all documents as paramount for the transformation of Panzano into organic wine production (five in total), which had been engaged in the transformation from the start. This provided depth of data rather than breadth, which was considered to be more suitable for the development of the IB. Moreover, an additional two interviews and a small survey were conducted with wineries in the Chianti Classico area for triangulation. The interviews were recorded. The interview guide was divided into four main blocks that enquired about the drivers and process of transformation, the role of networks, the sources of knowledge and the impact of the transformation on the economic, social and environmental sustainability of the firm to capture different aspects of the role of the innovation ecosystem in the transformation of Panzano.

The interviews took place either on the production field, where the interviewees could explain how much organic wine productions differed from conventional production or in their office. The notes taken during these field visits are part of the participant observation.

Writing and analyzing the IB “is a process of telling a real, detailed, and “thick” story covering all relevant aspects” [46] (p. 38). The use of IBs implies (i) the development of a biographical time-space path with the major milestones or events identified (sequence of events). (ii) For each event, information is collected on the actors involved, their relation (actors), and their location; (iii) the knowledge that they provided and if there was any conflict (barriers in the innovation process) [48]. The result is a chronological observation of the transformation of Panzano and the actors, networks, and institutions that enabled the transformation.

4. The Role of the Territorially Embedded Innovation Ecosystem in the Accelerated Transition of Panzano to Organic Wine Production

The transition towards organic agriculture in Panzano was not a linear process. Several key events can allow us to trace the historical process that brought Panzano to full organic wine production. The entire process is explained through three different phases.

4.1. Phase 1. Emergence—1992–2000

Organic production in Panzano can be traced back to the early nineties when a traditional wine producer in the area started experimenting with organic wine production in a small plot of his land (Interview 4). At that time, there was no sense of community in the region. Instead, each of the producers was fencing for itself (Interview 4).

The territory was just emerging from a profound crisis, which had forced producers to reduce the yield significantly to prevent the prices from sinking [49]. According to one of the interviewees, the region was making too much wine and of inferior quality. The wines were very light and not capable of age for a long time and, thus, not competitive in the international market.

Because of the crisis, many producers sold their farms. The new entrants did not come exclusively from the territory, but from other parts of Italy and from abroad. In other places in Tuscany and Chianti,

foreign people bought farms as an investment or for exploitation (Interview 2). Instead, those that acquired the farms in Panzano moved with their families to Panzano, reflecting a life-choice.

The latter might be one of the reasons why the newcomers were committed almost from the start to the production of organic wine. They had a strong sense of responsibility to the environment and their family (Interviews 1, 3 and 4).

To revert to methods of production that were not chemical-intensive, the producers turned to the older employees of their farm that had worked in the vineyards before the fifties (Interviews 1 and 4), their agronomists (Interview 3) and old books (Interview 4), in search of the required knowledge. They also started to share their experience and visit other neighboring farms, to get to know how others were experimenting with organic productions, thus creating the first seeds of social capital in the region. Cognitive proximity and social proximity facilitated knowledge sharing. Regarding cognitive proximity, all newcomers had higher education, although not necessarily as oenologist or agronomists. Concerning social proximity, most of the newcomers were of the same age, share a similar philosophy of life (Interviews 1, 3–5), and were open-minded (Interview 3).

Furthermore, newcomers almost immediately developed a strong sense of place. Place identity reflects how the producers talk about the wine—they wanted a wine that could “reflect the sense of place” (Interview 1)—something more “subtle and reflective of the place”.

Most of the wine producers were also part of a formal association of the wine producers of Panzano (Unione Viticoltori di Panzano in Chianti), which had been created in 1995 and agglutinated 20 out of the 35 Panzano producers. However, the association focused on the promotion of the local wine through a wine festival, rather than on creating a shared vision of the territory. It was not until the beginning of the year 2000 that the association started to play a different role, as discussed next.

4.2. Phase 2. Acceleration—2000–2016

A trigger event in the acceleration of the transformation to organic wines happened in 2000 when the Italian Ministry for Agriculture and Forestry forced all wine producers to use chemicals to fight an insect vector of the Golden Flavescence (“*Scaphoideus titanus*”) a disease that causes enormous damages to the vineyards. The disease can be transmitted from plant to plant if geographically close together. So, the Ministry made mandatory two specific strategies to fight it: a regular spray of pesticide on all the vineyards, attacked or not, and uprooting of all the infected plants.

The Tuscany region had historically few attacks of *Scaphoideus titanus* since it prefers humid habitats, and therefore the insect was not well known by the winemakers. To prepare a strategy that would allow limiting the use of pesticides, the Winemakers Association of Panzano in Chianti reacted as a group and asked for the support of a local agronomist (Interviewee 5). Together, they decided to propose a monitor program to understand the real danger of the pest in the area. The region reacted positively and changed the decree from the obligation to spree to the obligation to monitor and control. The monitoring was carried out with the scientific support of the CRA (Consiglio per la Ricerca in Agricoltura e l’Analisi dell’Economia Agraria) of Florence and the University of Pisa, and the Tuscany region approved it. The monitoring exercise showed that there was no presence of the insect in the region, and the use of pesticides was avoided.

The wine producers understood very clearly that, as an association, they had a strong influence and very tangible gains (Interview 4). The monitoring system based on the use of traps to identify the presence of insects was offered for free for the Panzano wineries. Therefore, the plague was a significant event in the transformation of Panzano, as they saw the value of being associated and acting together (Interviews 1–5). All the producers resisted using insecticides.

The success of the monitoring system strengthened the links among producers. It also allowed local producers to put their trust in the local agronomist (Interview 5), which is one of the pioneers of organic wines in Italy and on his approach to grape growing, which is rooted in two different levels of defense against pathogens: direct and indirect. The direct defense acts on the harmful agent, trying to neutralize it only in case of its presence in the vineyards. The direct approach makes use of copper and

sulfur-based compounds to stop the pathogen agent. Under the present legislation, organic agriculture can also use a direct approach of defense: synthesized chemicals are limited but not banned, and any winemaker can decide to spray copper and sulfur-based compounds once the risk is high. It follows that monitoring is crucial to reduce the use of them.

Indirect defense views the outbreak of pathology as a result of a two parts interaction: the pathogen agent and the plant. Therefore, it is reductive to focus only on the chemical elimination of the harmful agent. Instead, it is more efficient (and less impactful on the environment) to prevent detrimental outbreaks by focusing on the natural defense that every plant has. This approach is based on prevention, with the use of chemical compounds just for extraordinary attacks of pathogens.

The implementation of the monitoring system enabled the establishment of connections outside Panzano, with the CRA of Florence and with the universities of Florence and Pisa. Since 2000, the monitoring project never stopped, and the Ministry for Agriculture and Forestry revoked the obligation of regular treatments with pesticides, and the monitoring system was officially included in the allowed strategies to fight the “*Scaphoideus titanus*”.

In other words, the need for prevention against the “*Scaphoideus titanus*” was a challenge transformed into an opportunity. It is only due to the monitoring strategy success that the agronomist could start supporting some of the local winemakers in the transition to organic production (Interview 5).

A further step in the acceleration towards organic wines in Panzano happened in 2005, with the opening of SPEVIS (Stazione Sperimentale per la Viticoltura Sostenibile). SPEVIS is an experimental agronomical center for the development of sustainable wine production and the “Sustainable Panzano” strategy (Panzano Sostenibile) (Interviews 1, 3–5). SPEVIS was founded by the local agronomist in collaboration with local producers and research institutes, and it could be considered as a natural outcome of already existing informal collaborations. A unique characteristic of SPEVIS was that, although it was funded by only a handful of wine producers in the area, it provided advice and support to any local producer interested in shifting to organic wine production practices for free. The collective action taken around SPEVIS is another example of new place leadership involved in making things happen.

Nevertheless, the disruptive innovation of SPEVIS was not only the leadership per se but rather the way information was shared. In the case of SPEVIS, the goal was not only supporting their clients in the transition to organic wine production but rather to widespread as much and soon as possible the organic agriculture in the area. As a matter of fact, over time, SPEVIS published various types of booklets and researches studies online and for free. In 2008, SPEVIS presented its vision of sustainable viticulture, which became a “manual on organic wine production” the following year. Then, in 2011, they published a research-based manual, a yearbook for winemakers, a complete book with the description of Panzano’s methodology and philosophy (updated in 2014 in a new edition), and a combination of books and cd-roms on grape diseases.

Therefore, it is clear how any case study on Panzano wine cluster cannot leave behind this free flow of knowledge, available for not only the Winemakers Association’s members or the SPEVIS’ clients. The place leadership of SPEVIS was functioning as a meta-actor, and the free flow of knowledge on organic viticulture was nurturing the Panzano innovation ecosystem.

After the introduction of SPEVIS, the conditions for the acceleration of the transition toward organic winemaking were set. Panzano reached 50% of vineyards under organic production exceptionally soon. Part of this excellent result was due to the initial excitement. Some producers were already interested in organic agriculture, and the interaction between SPEVIS and the local Winemakers association opened up the way to a radical change. Since 2000, it has taken 12 years to reach 75% of organic vineyards and 16 to reach 95%, which is an incredible result and represents a strong example in the Italian scenario (see Table 1). The types of actors can partly explain the dramatic acceleration of the last years. If initially, it was only the small and medium-size producers that changed to organic; in the past few years, the large producers have finally adopted 100% organic agriculture (Interview 4).

Table 1. The role of the territorially embedded innovation ecosystem in the three stages.

| | Emergence 1992–2000 | Acceleration 2000–2016 | Stabilization 2016 Onwards |
|---|---|---|--|
| Estimated number of organic producers | 5 (14%) | 26 (75%) | 33 (95%) |
| Triggering event | Overproduction crisis; 2/3 drop of prices; obligation to reduce yield | Top-down decree to combat the potential damage of an insect on the vineyards | Creation of the Bio-district in Greve in Chianti |
| Place-based structural preconditions | Variety of wine producers moving into the area; knowledge variety | Creation of SPEVIS | Accumulation of knowledge and skills in the area with regards to organic wine production |
| Place-based agency | Informal contacts among organic wine producers | Collective action to prevent the use of chemicals; change of the law; free advice and fast knowledge transfer among producers; increase awareness; creation of a joint vision of the place "Panzano sostenibile." | The association of wine producers in Panzano as well as SPEVIS has triggered the establishment of bio-districts, first in the county of Greve in Chianti and later on expanding to all Chianti Classico region. Structuration through the formalization of national laws on organic production and bio-districts |
| Role of the territorially embedded innovation ecosystem | Limited. Most of the producers acting individually. Formal association focused on the organization of the local wine fair. No shared vision | Fundamental for the rapid spread of information; consolidation of social capital and the structuration of actions around a collective vision of the place | Oriented towards scaling up and spreading the skills and experiences to other localities |

Source: Own elaboration based on the interviews.

4.3. Phase 3. Stabilization and Scaling Up—2016 Onwards

Thanks to the propulsive thrust of SPEVIS, to the commitment of the AIAB (Associazione Italiana Agricoltura Biologica), and the will of the mayor of Greve in Chianti, on September 27, 2016, the Bio-district of Greve in Chianti was officially established [50]. According to one of the interviewees (Interview 3), the success of the joint response to the "Scaphoideus titanus" crisis triggered the idea of the bio-district. The bio-district aims to bridge the gap between farmers and citizens and enable spaces for the dialogue between policymakers, producers, consumers, and citizens to build shared visions about what the region could be (Interview 4). The latter is entirely in line with the sense-of-place discussed earlier [14].

Similar bio-districts soon followed the Bio-District of Greve in Chianti in Gaiole in Chianti, and more recently, the entire Chianti Classico became a bio-district (Interview 4). The latter refers to the entire DOCG Chianti Classico wine production area, and it has the goal to support the transition to organic agriculture of the entire area of Chianti Classico. Further structuration of the change is taking place in the forms of new laws. According to one of the interviewees (Interview 4), the Italian government is discussing a new law regarding organic agriculture, and one of the chapters in the law will be about bio-districts.

The success of Panzano is now widespread in the entire wine region, and today, 35% of agricultural land in the Chianti Classico area is organic [50]. Interestingly, not all the wine producers of Panzano identify themselves with the bio-district as strongly as they do with the Association of Panzano wine producers (Interview 1). In this sense, the regional bio-district does not trigger as strong a sense of place as the Panzano area does.

The transition to organic was not only influenced by place, but it also influenced place. Physically, the transformation to organic was also visible from the outside. In the words of one of the interviewees (Interview 1), it changed the landscape. For example, in particularly rocky places, the stones were not visible after a while, because the soil was so fertile that the rocks would not separate from it. Going back to more traditional production techniques also reinforced the linkages with the place.

5. Discussion

This paper analyzes a wine region in which the sustainability transformation towards organic wine production took place much faster than in the neighborhood regions. Our point of departure was trying to understand why this was the case. We used innovation biographies to capture the trajectory within the innovation ecosystem: we build a timeline, identifying the stages in the transformation (emergence, acceleration, and stabilization) and the triggering events that supported the transformation from one stage to the other. We focus on how the whole transformation could be achieved at a much faster pace than in surrounding localities. We look at actors and formal and informal networks and their embeddedness in the territory and how they influence institutional change at the regional and national levels.

The main contribution of this paper is to bring the role of the territorially embedded ecosystem to the discussion on the speed of sustainability transformations. In doing so, we look at both place-based structural preconditions and well as the place-based agency.

Our findings suggest that structural preconditions and place-based agency are essential for sustainability transformations, but not at the same stages in the transformation. Structural preconditions are paramount in the early stages of the transformation, together with the entrepreneurial agency. However, the place-based agency, and to a lesser extent, institutional agency, and becomes paramount in the acceleration phase.

In the case of Panzano, sharing knowledge about the transition to organic agriculture was crucial for the speed of the transformation. Both pioneers' farmers and SPEVIS, in collaboration with universities, were working as a source of knowledge for the conventional farmers that found it easy and convenient to shift to organic agriculture. The social and geographical proximity fostered the share of knowledge, and the result confirms that innovation ecosystems are constructed relationally [17] on a strong sense of place [14].

The role of a local leader and intermediary–SPEVIS– was crucial. The local leader reduced the gap between the farm and the market, supporting the farmers in the transition to organic viticulture. A unique characteristic of SPEVIS was that it provided free advice and support to any local producer interested in shifting to organic wine production practices. The success of SPEVIS may suggest that supporting the access to knowledge through the action of local meta-actors cooperating with the local firms is crucial for sustainability transformations. Furthermore, conventional farmers consider the first step towards organic as the most “expensive” due to the need for new skills, materials, and suppliers. In this perspective, the free advice and support received from SPEVIS was paramount to convince conventional wine producers to move towards organic production. In other words, the institutional agency is essential in the acceleration phase, but it should be intertwined with the place-based agency that only local leaders can guarantee.

Interestingly, the regional bio-district in Chianti is not transiting to organic at the same fast pace, because it does not trigger the strong sense of place as the Panzano area did. This insight of our research opens up a relevant field for future research: how to reproduce at a larger territorial scale the sense of place and the social capital, due to the density of relations that might accelerate the transition?

Is it better to refer to a larger region for a transformative change or to a mosaic of small territorially embedded innovation ecosystems?

These findings may have important policy implications. Policies tend to look at sustainability transformations, either at the macro-level of the market or the micro-level of firms, neglecting the role of the territory (meso level). A territorial approach to policy-making could illuminate the discussion on how to accelerate sustainability transformations. Our findings show that a strong sense of place facilitates a dense network of relations, which in turn fosters knowledge development and diffusion, a vital function of an innovation ecosystem. The pace of the transition can be accelerated by an effect of neighboring, which fosters social interaction and visibility [40].

Our study also reveals that the transition towards sustainability is not a linear process. Structural preconditions and different forms of agency play a different role at different stages in the transformation and thus require different policies over time, but also over space. For instance, while in some regions, it is still crucial to enhance better structural preconditions, in some others, fostering the cooperation among actors to widen the existing knowledge is paramount.

The case of Panzano highlights the importance of place-based approaches to the study of sustainability transformations [14,15]. Innovation ecosystems, understood through this place-making lens, could potentially be a powerful mechanism for accelerating transformations. While promising, our research is based only on a single case study. The observed mechanisms that facilitated an accelerated transformation to organic agriculture in Panzano may also operate in other regions or sectors but remain to be studied. For that, a systematic comparative analysis of different accelerated regional transformations is needed.

Author Contributions: Conceptualization, C.C. and F.R.; methodology, C.C. and F.R.; validation, C.C. and F.R.; formal analysis, C.C. and F.R.; investigation, C.C. and F.R.; resources, C.C. and F.R.; data curation, C.C. and F.R.; writing—original draft preparation, C.C. and F.R.; writing—review and editing, C.C. and F.R.; visualization, C.C. and F.R.; supervision, C.C. and F.R.; funding acquisition, C.C.. All authors have read and agreed to the published version of the manuscript.

Funding: This work was partly supported by the EU-RISE project Makers (Smart Manufacturing for EU Growth and Prosperity). H2020 Marie Skłodowska-Curie Actions (Grant number 691192).

Acknowledgments: Cristina Chaminade would like to thank Marco Bellandi at the University of Florence and Fondazione per la Ricerca e L'Innovazione (Florence), for hosting her in Florence for half a year and supporting the research on regional sustainability transformations. Both authors would like to thank the interviewees for the richness of their insights and their generosity with their time. We thank the three anonymous reviewers for their careful reading of our manuscript and their many insightful comments and suggestions.

Conflicts of Interest: The authors declare no conflict of interest.

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