

NETWORK IMPACT OF SOCIAL INNOVATION INITIATIVES IN MARGINALISED RURAL COMMUNITIES

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Highlights

- Short term evaluation framework of the Social Innovation (SI) is proposed
- Quantitative indicators are based on the comparison of two groups of farmers
- SI caused network reconfiguration in farming communities creating new relations
- SI transformed acquaintance relations into active and permanent relations
- The network intervention enhanced entrepreneurship for new business formation

NETWORK IMPACT OF SOCIAL INNOVATION INITIATIVES IN MARGINALISED RURAL COMMUNITIES

Abstract

The marginalised rural communities are characterised by societal challenges, such as isolation, lack of job opportunities, land abandonment, low quality of life and generally low education. Social Innovation (SI) initiatives may represent an opportunity to strengthen relationships among the members of rural community, by means of the alteration of the existing social networks. In this way, more exchange of information is expected, paving the way for the creation of professional collaborations among firms and other actors. This paper aims at proposing a short-term evaluation framework of effectiveness of a SI initiative in terms of reconfiguration of the social network structure. The described empirical case study is V&Zapp', a rural hub located in Southern Italy, which provides innovative solutions to activate social relations amongst farmers, altering hence their network. A well-referenced SI theoretical model, developed within the H2020 project SIMRA (Social Innovation in Marginalised Rural Areas), and the methodology of Social Network Analysis (SNA) were used to verify and measure quantitative and qualitative indicators affected by network intervention activated by V&Zapp' initiative. Results show that this SI initiative worked effectively, leading to a +308% in the number of relations and +250% in social network density. In addition, an evident improvement in the quality of the social relations was found, especially in cases where there are direct engagements within V&Zapp'. Outcomes suggest that supporting and promoting SI initiatives could become a central discussion point for the rethinking of rural development policies focused on regeneration of social relations' structure.

Key words

Social Innovation; Marginalised Rural Areas; Farmers Communities; Network Intervention; Social Network Analysis; Rural Hub.

1. Introduction

At least 44% of European land is classified as rural and is affected by progressive depopulation towards urban and metropolitan areas (European Commission, 2019; Zolin et al., 2017). Within the heterogeneity of rural areas in the European Union (EU), there are some specific difficulties in common, mainly linked to demography, land use, remoteness, and education, as well as some special features of the labour market (European Commission, 2008).

Generally, these areas could be further identified as marginalised, in case they are located in mountainous and remote regions, in which physical, economic, and social isolation conditions

reach critical levels (Wolff et al., 2015). More specifically, the marginalisation refers to the wide equity gap in terms of job opportunities, life quality, public services, health care, and education level, with respect to central and developed areas. In this regard, it is worth mentioning the EU H2020 SIMRA (Social Innovation in Marginalised Rural Areas) project, which deals with an in-depth analysis of all relevant aspects characterising the marginality of rural communities. Amongst these, an emerging element pointed out in the present study is the decrease in social relationships amongst individuals, groups, and communities (Bassi et al., 2014; Price et al., 2017), constraining the competitiveness of firms and limiting the diffusion of knowledge and innovation (Dias and Franco, 2018).

The contribution of Social Innovation initiatives to offset the aforementioned issues relies on the capacity to strengthen relationships amongst actors, leading to a modification of the existing social networks. In this way, more exchange of information is expected, paving the way for the creation of professional collaborations among the community members.

The concept of SI in Marginalised Rural Areas (MRA) is not new. In fact, in order to find solutions to contrast marginalisation, the EU has already added policies for addressing the improvement of social capital, co-funded by member states and EU convergence funds, for investments in infrastructure, such as roads, railways, harbours, industrial settlements, electric grids, and digital infrastructures. In this regard, EU has identified 7 priority challenges (Reg. (EU) No 1291/2013 – Annex I, Part III), where targeted investment in research and investment can have a real impact benefitting the whole society, and are among the pillars of the 8th Framework Programme for Research and Innovation (2014-2020) – Horizon 2020: (a) Health, demographic change and well being; (b) Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bio-economy; (c) Secure, clean and efficient energy; (d) Smart, green and integrated transport; (e) Climate action, environment, resource efficiency and raw materials; (f) Europe in a changing world - Inclusive, innovative and reflective societies; (g) Secure societies - Protecting freedom and security of Europe and its citizens.

In particular, among the research projects funded by the EU within the Horizon 2020, the above-mentioned SIMRA project, focused on challenge (b), since it is specifically addressed towards the marginalized rural areas. In fact, SIMRA envisages the role of social innovation (SI) and innovative governance in agriculture, forestry and rural development (RD), as key elements to boost the development of marginalised rural areas across Europe.

According to SIMRA project, SI is conceived as *“the reconfiguring of social practices, in response to societal challenges, which seeks to enhance outcomes on societal well-being and necessarily includes the engagement of civil society actors”* (Polman et al., 2017; Kluvánková et

al., 2017, 2018). The SIMRA consortium proposed a complex well-referenced SI model (Secco et al. 2017), for assessing and evaluating social innovation in marginalised rural areas at the local level. The model consists of some key dimensions (individual and collective needs; perceived context; agency; reconfiguring and reconfigured social practices; activities; outputs; outcomes and impacts; and, learning processes), each of them with a set of premises.

In order to achieve the aim of the current research, the authors have selected only three essential elements of this model, in line also with the Polman's SI definition: (a) the premises of "individual and collective needs", i.e. *trigger*, (b) the "agency", i.e. *engagement of stakeholders*, and (c) the dimension *reconfiguration of social practices*.

More specifically, the model depicts a process starting from triggers, intended as shocks taking the form of physical loss (e.g., environmental disaster, flooding, or drought), social movements (e.g., general strikes and turmoil, massive immigration, and emigration), economic or financial crises (e.g., collapse of local markets facing globalisation). Whereas these shocks accumulate and get to a certain threshold of hardship, they trigger a reaction of the actors with consequent engagement. As a result, the actors start to act with the scope of reaching a desirable and comfortable state. This makes them capable of cooperating and changing their behaviour. Therefore, the close interaction amongst agents leads to a shared vision and reconfiguration of social networks, practices, and rules. Such a process enriches the endowment of social capital, which is an important asset to foster local development (Pindado et al., 2018; de los Ríos et al., 2016). This reconfiguration process could be described by the following aspects: (i) the structure of the network, (ii) the nature of the relationships, and (iii) the stabilisation of the relationships.

Starting from this theoretical model, the aim of this paper is to propose a short-term evaluation framework for assessing the effectiveness of a SI initiative in terms of social network reconfiguration in a rural community. In this regard, the paper contributes to fill the literature gap in methodologies for a rigorous assessment of network impacts of social initiatives. More specifically, starting from basic indicators of who-know-who network, some other indicators, related to the quality of agents' engagement in the short term, are proposed.

The empirical case study relates to V&Zapp', a rural hub located in Southern Italy, which provides innovative solutions to activate social relations amongst farmers (Lombardi, 2017; Baseline et al., 2018). Southern Italy is a representative area of many other MRAs across the EU because of similarities in terms of typical social challenges, such as brain drain (massive emigration of highly educated young people), high youth unemployment rate, and dramatic ageing of farmers (May et al., 2019). The reconfiguration of farmers' social networks, achieved by V&Zapp', can be conceived as a network intervention, defined by Valente (2012, p. 49) as

“purposeful efforts to use social networks or social network data to generate social influence, accelerate behaviour change, improve performance, and/or achieve desirable outcomes among individuals, communities, organizations, or populations”.

The methodology is based on Social Network Analysis (SNA), using quantitative and qualitative indicators. To the best of our knowledge, there is a literature gap in empirical application of social networks to remote rural communities. The majority of scientific papers concern the use of social networks for disseminating innovation in rural communities (Isaac et al., 2007; Matous and Todo 2018). This paper presents some similarities specifically with Matous and Wang (2019), where several farming communities have been studied to understand the role of some individuals in the diffusion of innovations within their social networks. In addition, the same article also describes a concrete case study of social innovation applied to farmers’ communities as tool for changing structure of social relations, a relatively new research in this field.

The social innovation initiative V&Zapp’, for activating a social innovation pathway in the agriculture sector, uses different tools. One of this is the event Farmers’ Dinner, an interacting format aimed at gathering farmers into one farmhouse, helping them in developing and tightening relationships with their neighbours. Certainly, the event is based on a structured and systematic preparation of the siting and the selection of participants. Invited farmers are chosen among people who are already acknowledged about the general aim of the initiative of V&Zapp’ team, are neighbours of the hosting farmer, are trustful, share the same basic cultural values (i.e. Christian Catholic, with good attitude towards other community members), have a strong sense of belonging to the same territory, are committed to agricultural development. During a Farmers’ Dinner local stakeholders are also invited to participate, to get in touch with farmers and to exchange information. In such a context, they all develop new relations. Moreover, increased trust, motivation, dignity, and sense of community are also generated. This process is supposed to create the conditions for farmers to collaborate in challenging new businesses (Dias and Franco, 2018; Villamayor-Tomas et al., 2019).

The structure of the paper consists of the following sections. Section 2 relates to the scientific background and literature review of SI, focussing on rural communities. Section 3 and Section 4, respectively describes the methodology and data collection, and the case study. In Section 5, the results are shown and discussed. Finally, concluding remarks are reported in the last section.

2. Background and literature review

2.1 Definition of Social Innovation

In recent years, SI has been applied in various sectors of the economy, involving heterogeneous actors in collective initiatives. The SI pathways are mostly developed in the third sector, primarily for integration and social assistance, as well as for training (Cirilli and Speroni, 2016). Its importance is linked to the ability of finding new models of socioeconomic development by means of bottom-up approaches, capable of meeting the needs of the local community more effectively than the classic top-down policy interventions (Lombardi, 2017). The EU has recognised the importance of this approach and has promoted a series of initiatives to encourage the application of SI within the member states (Regulations No. 1296/2013; 1303/2013; 1304/2013).

At present, the debate on SI is enriched by a variety of contributions, both at academic and institutional levels. Table 1 summarises the main steps characterising the evolution of the concept of SI derived from studies in economics, sociology, and business domains.

Table 1 Evolution of SI definition from 1980 to 2017

Decade	Definition	Reference
1980	Sociological factors to understand which mechanisms influence the cultural change in certain contexts.	Nussbaumer and Moulaert (1982)
	Community and mass management as a producer and consumer of new services or products.	Drucker (1987)
1990	Co-decision making and collective creation.	Crozier and Friedberg (1993)
	Big Society: to encourage the development of citizens' initiatives to compensate for the inefficiency of the state activity.	Giddens (1998)
	Minimum State: supply of products and services by the state increasingly bound to the logic of the market.	Bonoli et al. (2000)
2000	Open innovation model: horizontal relationships amongst several companies to acquire the best innovative ideas from the outside.	Chesbrough (2003)
	Achievement relevance of a social target and origins from the nonprofit world and identification of models of public–private partnerships.	Mulgan (2006)
	Catalytic innovation: a model of social innovation that facilitates the identification of the simplest solutions for categories of citizens not yet satisfied.	Christensen et al. (2006)
	Mediation process and selection of information.	Huston and Sakkab (2006)
	Distinction of three macro categories of social innovation: techno– economic, regulatory– normative, and cultural.	Hamalainen and Heiskla (2007)
	Information flows provided by users connected through Web 2.0 to promote the research of social innovation.	Flew et al. (2008)
	Pragmatic approach, aimed at identifying organisational models capable of promoting institutional change, social purpose and the	Pol and Ville (2009)

common good.

2010	To develop business activity through a pragmatic approach for identifying solutions to social problems.	Murray et al. (2010)
	Economic–managerial dimension vs. public decision-making.	OECD (2010)
	Search for new social needs and new forms of collaboration between groups and individuals.	BEPA (2011)
	Social impact: improvement of the social result in comparison with the past.	Neumeier (2012)
	The production of new ideas and new structures, as well as a process of re-contextualisation, within (defined) social norms concerning the public good, justice, and equity.	Nicholls and Murdock (2012)
	The role of the community as a facilitator and disseminator of social innovation.	Guida and Maiolini (2013)
	Proximity relationship: capacity of a political, social, and cultural identity of community in a context.	Pellizzoni (2014)
	New social technologies that create new social value.	van der Havea and Rubalcaba (2016)
	Three elements characterise social innovation: the processes of social change, sustainable development, and the service sector.	Edwards-Schachter and Wallace (2017)
	The reconfiguring of social practices, in response to societal challenges, which seeks to enhance outcomes on societal well-being and necessarily includes the engagement of civil society actors.	Polman et al. (2017)

Source: Lombardi (2017); Polman et al. (2017)

In addition to this summary, which cannot be considered exhaustive, a worthy review was carried out by Edwards-Schachter and Wallace (2017), reporting a comprehensive and accurate analysis of all contributions on the social innovation definition from 1955 to date.

Nevertheless, a univocal and internationally recognised definition does not exist. However, there are valuable contributions that introduce two relevant concepts, such as the role of the community and its engagement. In the White Paper on Social Innovation by Murray et al. (2010), SI is defined as: *“new ideas (products, services and models) that simultaneously meet social needs and create new social relationships or collaborations. In other words, they are innovations that are both good for society and enhance society’s capacity to act”*. The contribution that ultimately conceptualises the engagement of the civil society is the one developed within the SIMRA consortium (Polman et al. 2017): *“the reconfiguring of social practices, in response to societal challenges, which seeks to enhance outcomes on societal well-being and necessarily includes the engagement of civil society actors”*.

The reconfiguration of social practices implies the creation and transformation of formal or informal institutions as governance arrangements, values, and social norms (Klůvanková et al., 2018). Amongst them, this study will focus on the reconfiguration of social networks.

2.2 Social innovation in marginalised rural areas

The application of SI in rural areas is not new. In fact, the EU launched the first initiative for supporting rural development projects at the local level in 1988, in order to revitalise rural areas and create jobs (LEADER Programme).¹ At that time, local action groups (LAGs) were established in order to manage projects to be developed in small rural areas (Menconi et al., 2017), those having populations between 10 000 and 100 000 inhabitants. In 2013, the LEADER approach was extended to urban and coastal areas under the label of community-led local development.

Recently, the contribution of SI to the development of rural areas has been explicitly recognised to be effective in overcoming typical problems of marginalised areas affected by urgent societal challenges, such as isolation, lack of opportunities for young people, and ageing (Petruzzella et al., 2017). MRAs need reconfigurations of social practices, starting with the engagement of civil society actors. The maintenance of MRAs is motivated by the important cultural and economic roles in the provision of primary goods that are valuable sources for the food supply chain (Wilson and Whitehead, 2012), environmental resources management, and landscape protection. Actually, agriculture has undergone deep transformations, during the last 60 years, that changed its productions and affected the economic and social conditions of the rural populations (Cannata, 2015). This situation is more evident in the regions of Southern Italy, where the economic status is generally poorer, compared to the rest of the country.

According to Lombardi (2017), the main problems of the sector are related to:

- a significant and constant reduction of both the number of farms and the utilised agricultural area (UAA), since 1982. As a consequence, there has been a continuous, thus structural, change in the sector in terms of a progressive abandonment of the activities or a diversion of farmland to industrial or residential settlements;
- a low generational turnover. In fact, only 10% younger than 40-years-old are head-farmers (INEA, 2014), while the remaining are approximately 55-years-old; and
- a low level of education, with 71% of the head-farmers do not detain a high school diploma (ISTAT, 2013).

¹ LEADER I ran from 1991–93, LEADER II from 1994–99, and LEADER+ from 2000–2006. In the current programming period (2014–2020), the LEADER method has been extended to cover not only rural but also coastal (FARNET) and urban areas under the banner of community-led local development (CLLD).

Over time, the proposed innovative models of modernisation, productivity (capitalisation, search for efficiency and reduction of costs per unit of product), and quality were adopted in agriculture with policy support. However, these efforts have not been sufficient to resolve the aforementioned problems because of limited investments addressed to rural society, their welfare, and their quality of living, thus, the agriculture sector has been progressively isolated and fragmented with severe impacts on the relations amongst actors.

For these reasons, it is necessary to consider an alternative approach to rural development, in which farmers' networks become a central focus. Ideally, SI models are applied to rural areas in which farmers are beneficiaries and are able to improve social structure. In addition, SI meets collective needs with a bottom-up approach; it promotes economic self-sustainability without a strong dependency on public funding; and it makes MRAs more attractive for investments.

Such an ideal model would point at the following objectives:

- an increase of the generational turnover with a reduction in the average age of farmers;
- a higher education level of the younger generation involved in agriculture;
- a higher capability to adopt a more innovative and sustainable agriculture;
- a greater appeal and dignity for working in agriculture; and
- an increased level of trust amongst neighbours with a consequently higher capacity to develop collaborations and cooperation.

The adoption of SI models would contribute to revitalise rural areas by stimulating the collaboration with public administrations and fostering the culture of democratisation in rural communities (Petruzzella et al., 2017).

3. Materials and method

3.1. Social Network Analysis

From the methodological point of view, the SNA has been adopted since it is suitable for a quantitative analysis of the relational structures by means of well-consolidated indicators. The SNA is based on a solid theoretical framework focused on social relations affecting actors' behaviour. In particular, a social network is a social structure made up of actors (individuals or organisations) called "nodes" connected by one or more link through socially meaningful relations.

Scholars have used the social network concept for more than a century to analyse complex sets of relationships amongst members of social systems at all scales (from interpersonal to international), but the research field has changed in significant way during the last decades, expanding the use of systematic SNA. Social network analysts are suitable to examine the relations amongst actors,

how actors are positioned within a network, and how relations are structured into overall networks (e.g., Scott 2011; Van der Hulst, 2009; Borgatti et al., 2009; Hanneman and Riddle, 2005; Freeman, 2004; Wasserman and Faust, 1994; Galaskiewicz and Wasserman, 1993; Granovetter, 1985, 1990; Wellman and Berkowitz, 1988). The SNA approach allows for better understanding of the relations inside networks on two different levels: the node, focused on an actor's position in the network, and the network level, analysing the network structure as a whole. More specifically, Bassi et al. (2014) applied SNA to study the role of the inter-firm network in the rural development initiative.

This study adopts UCINET software (Version 6.667), which is currently one of the most widespread tools aimed at performing a complete analysis of networks. It provides practical tools to perform positional measures and graphical representations allowing researchers to identify, represent, analyse, visualise, or simulate nodes and relations (Borgatti et al., 2002).

3.2. Hypotheses setting and validation method

As already mentioned in the introduction section, this paper is aimed at validating a well-referenced SI model through a case study (SI initiative) as a purposeful network intervention. Following Valente (2012), the authors recognised the specific initiative of the case study as an alteration strategy of network intervention, since it deliberately attempts to reconfigure the existing network in order to enlarge (adding nodes) and make denser (adding links) it, and generating new kinds of links. To this purpose, it is necessary to verify: (i) whether the case study satisfies the basic requirements for the application of the SI theoretical model (namely the local community is affected by triggers, and the agents are engaged in a communal initiative), and (ii) whether the SI initiative is capable of creating and reconfiguring the social networks of the community.

The analysis will verify three different hypotheses on the social network's alteration by means of the measurement of SNA indicators. Figure 1 depicts the basic features of the model leading to the research hypotheses.

Figure 1 Social innovation theoretical model

Source: own elaboration, 2019

First hypothesis (*H.1–growth*): *actors involved in the SI initiative are able to interact with other actors, and this leads to an increase in the number of relations amongst them.* This concerns the quantitative increase (growth) of the social networks, by establishing acquaintance or w-k-w (who-knows-who) relations. In order to measure this variation, SNA indicators have been used to

quantify the number of new relations created by the initiative. While facilitating this social interaction, the initiative also creates the opportunity for the actors to make valuable exchanges of immaterial resources (information, knowledge, know-how, expertise, and skills). The actors capable of anticipating this opportunity will expect benefits from the exchanging process, and this motivates them to be engaged (i.e., participating in the activities) with the SI initiative (Nahapiet and Goshal, 1998). As a consequence, two categories of actors emerge: followers (personally engaged in the SI initiative) and non-followers (attendance to only one event organized by the SI initiative). Specifically, followers are participants who accepted the SI initiative philosophy and are keen to be engaged in its activities, for instance providing personal support in organising training and information events or participating in services and goods business to business exchange. In other words, while followers engage with the SI initiative, non-followers remain at an informative stage on its activities. The engagement enables followers to establish information exchanges and professional agreements due to the sharing of values, the convergence of expectations, and the raising of trust created by the interaction. This leads to the next hypothesis.

Second hypothesis (*H.2—qualitative change*): *followers establish more active relations (i.e., information exchange and establishment of collaborations) with respect to non-followers.*

This hypothesis relates to the qualitative change of social networks, which is measured by the number of active relations, namely the conversion of existing links in forms of collaborations or useful information exchange. Actors experiencing beneficial exchanges will be more motivated at reiterating further exchanges; this will lead to the stabilisation of their relations. From this descends the last hypothesis.

Third hypothesis (*H.3—stabilisation*): *followers establish more permanent relations with respect to non-followers.* The last hypothesis refers to the stabilisation of the social networks. The related indicator (number of permanent relations) will measure the number of relations, which became permanent within the developed network.

To validate these hypotheses, a survey to participants has been undertaken through a questionnaire made of four questions (see the structure in Table 2).

Questions Q1, Q2, and Q3 are aimed at collecting information on the existing relations (c_i) actually amongst all the hypothetical relations (C) connecting the participants. This is done by means of a *roster recall* technique, that is, each respondent (p_i) is provided with the list of the participants (P) to the event and is asked about the relations actually established with all of them. The last question (Q4) refers to the respondent itself, in order to determine if he or she is a follower or a non-follower.

Table 2 The structure of the questionnaire

Cod.	Question	Response kind	Response option	Data extracted
Q1	When you became acquainted to participant p_i ?	Multiple	<ul style="list-style-type: none"> - already known before the event - known during the event - unknown 	i) initial set (X) of w-k-w relations (relations established before the social event) ii) set (N) of newly created w-k-w relations
Q2	Did you exchange information or establish collaboration with p_i after your attendance in the social event organised by the SI initiative?	Dichotomous	yes/no	iii) set (A) of active relations
Q3	Did you establish a permanent relation (talking and/or meeting regularly) with p_i after your attendance in the social event organised by the SI initiative?	Dichotomous	yes/no	iv) set (D) of permanent relations
Q4	Did you keep following the SI initiative activities after your attendance in the social event?	Dichotomous	yes/no	vi) set (P_f) of followers vii) set (P_u) of non-followers

The data have been organised in the datasets listed in Table 3.

Table 3 Datasets for SNA

Description	Set notation	Set definition (with reference to questionnaire in Table 2)
Sets of participants (followers and non-followers)	$P_{f,u}$	$P_f = \{p_i \in P \vee p_i \text{reports} "yes" \in Q4\}$ $P_u = \{p_i \in P \vee p_i \text{reports} "no" \in Q4\}$
Initial sets of w-k-w relations (existing <i>before</i> the social events) respectively for followers (f) and non-followers (u)	$X_{f,u}$	X $= \{c_i \in C \vee p_i \text{reports} "alreadyknownbeforetheevent" \in Q1\}$
Sets of newly created w-k-w relations (formed <i>during</i> the social events) for followers (f) and non-followers (u)	$N_{f,u}$	N $= \{c_i \in C \vee p_i \text{reports} "knownduringtheevent" \in Q1\}$
Final sets of w-k-w relations (remaining <i>after</i> the social events) for followers (f) and non-followers (u)	$T_{f,u}$	$T = X \cup N$
Sets of active relations for followers (f) and non-followers (u)	$A_{f,u}$	$A = \{c_i \in C \vee p_i \text{reports} "yes" \in Q2\}$
Sets of permanent relations for followers (f) and non-followers (u)	$D_{f,u}$	$D = \{c_i \in C \vee p_i \text{reports} "yes" \in Q3\}$

Source: Authors based on Wassermann and Faust, 1994

The set of participants (P) is divided into two subsets, followers (P_f) and non-followers (P_u). The w-k-w relations are distinguished according to the timeline of the SI initiative they refer: before the event (X), newly created with the event (N), and after (T). The sets of active (A) and permanent

(*D*) relations are also identified. Each set is then divided into two subsets according to the nature of participants (followers and non-followers).

The **hypothesis H.1** is verified if $|T| > |X|$. This means that the number of relations existing amongst the participants *after* the SI initiative is larger than the number of relations *before*. In addition, other SNA indexes are also considered to support the consistency of the test. Table 4 reports the description of the indexes used for the *after-before* analysis and the expected sign of their variation.

Table 4 Social network indexes to validate the first hypothesis

Indexes	Description	Calculation	Expected sign of (after-before) variation
		$r = S $ [1]	
Number of Relations (<i>r</i>)	Number of all relations actually existing	where $ S $ is the cardinality of the set <i>S</i> (i.e., the measure of the number of elements of the generic set of relations <i>S</i>)	Positive
		$ad = r/ P $ [2]	
Average Degree (<i>ad</i>)	Average number of relations per participant	where $ P $ is the number of participants	Positive
Density (<i>d</i>)	Proportion of all possible relations actually existing	$d = r/[P (P -1)]$ [3]	Positive
		$cr = (ns-1)/(P -1)$ [4]	
Component Ratio (<i>cr</i>)	Number of strong components (i.e., components of the network in which each node is reachable) minus one, divided by the number of participants minus one	where <i>ns</i> is the number of strong components	Negative
		$F = pu/pa$ [5]	
Fragmentation (<i>f</i>)	Proportion of pairs of participants which are unreachable	where <i>pu</i> is the number of pairs of actors that are unreachable, and <i>pa</i> is number of all pairs of participants	Negative

Source: Authors based on Wassermann and Faust, 1994

The first three indicators capture the role of relational matching played by the initiative, and they are strictly interconnected. The first (*r*) relates to the rough number of relations; the second (*ad*) is the average number of people each actor knows. These two indexes are expected to increase after the SI event, along with the density (*d*) of the network.

On the contrary, the component ratio (*cr*) counts the number of connected components in which the network is divided, and the fragmentation (*f*) is an index of marginalisation of the single actors

within the network. In other words, the former measures the number of close circles in which the network is divided; the latter is a measure of the social marginalisation of the individuals within the network. Due to the interconnecting role of the social innovation, these two indexes are expected to diminish after the event.

The **hypothesis H.2** is verified if $|A_f| > |A_u|$. This means that the number of active relations established by followers is larger than the number of active relations established by non-followers.

The **hypothesis H.3** is verified if $|D_f| > |D_u|$. This means that the number of permanent relations established by followers is larger than the number of permanent relations established by non-followers.

From an operational point of view, the number of relations is expressed in relative terms to overcome the different size of the followers and non-followers groups.

4. Case study: the social innovation initiative of VàZapp'

The case study refers to the social innovation initiative VàZapp', located in the province of Foggia (Apulia region - Southern Italy), which has organised a cycle of social events, called Farmers' Dinner, in order to activate a social innovation pathway in the agriculture sector. The Figure 2 describes the difference between VàZapp' and the Farmers' Dinner: the first is a rural hub promoting a social innovation model while the second is one of tools through which VàZapp' has been able to promote relationship amongst farmers so far.

Figure 2 - Case study: VàZapp' and Famers' dinners

Source: own elaboration, 2019

The literal meaning of the word VàZapp' is "go hoeing the soil", which, in the intention of its founders, actually stands for "dedicate yourself to farming" and "being a farmer is important and it is a highly dignified job". VàZapp' was formed by a group of young talents with diverse expertise, such as architects, designers, communication and media content professionals, academics and data analysts, farmers, agronomists, and social media managers, for a total of 20 people working on the project.

This rural hub has been selected as social innovation example since it completely fits with the theoretical framework, described in the previous part, for evaluating the social innovation effectiveness to reconfigure the social network structure.

This has been verified by the authors with a preliminary study, which has attested the presence, in VàZapp', of the two premises essential to define the system boundaries of the research and to

characterize the case study, such as trigger and engagement. The former is the element characterising the creation of the SI initiative, i.e. the formation of VàZapp' team; the latter is the element to favour the development of SI in agriculture, i.e. the involvement of civil society from farmers to professional and citizens.

For catalysing the creation of relations within the rural context, enabling farmers to reconfigure their social networks, VàZapp' has used different tools: one of these is the Farmers' Dinner, as afore-mentioned. This is a format where a host farmer, with the support of the VàZapp' team, opens his or her house to other farmers living in the neighbourhood for a dinner where the participants meet each other, probably for the first time. To increase the effectiveness of this tool, according to the VàZapp' protocol for the Farmers' Dinners, participants are not allowed to attend more than one dinner. The format is based on a dynamic interaction promoted by a moderator (belonging the VàZapp' staff), which encourages the formation of new relations.

VàZapp' experimented with the format in 19 different locations in its territory, from February 2016 to June 2018 (Figure 3).

Figure 3 - Location of the 19 Farmers' Dinner events

Source: own elaboration, 2019

4.1. Data collection from Farmers' dinners

In order to carry out a short - term evaluation of the effectiveness of VàZapp', according to the theoretical model proposed by the authors, a survey of 334 participants in Farmers' Dinner events has been undertaken through a questionnaire made of four questions (Table 2). The interviewers' contacts were previously collected by VàZapp' team during all the events and archived in a database of its property afterwards (Baselice et al., 2018).

The questionnaire was elaborated by the authors using Google Module and sent by email and short message service (SMS). Due to the low percentage of feedback from using these tools, the authors decided to directly call the participants, and 51% (171) of them finally answered. These allowed the authors to collect data and build 16 networks to apply SNA.

The authors collected data referred to only 16 out 19 Farmers' Dinners since it was not possible to get the complete list of the participants for the first three events.

Table 5 shows the details of data collection for the 16 Farmers' Dinners.

Table 5 Data collection for each Farmers' Dinner

Farmers' Dinner No.	Participants	Respondents (set <i>P</i>)	Potential relations (set <i>C</i>)
4	25	15	600

5	23	5	506
6	26	17	650
7	19	9	380
8	19	3	342
9	21	2	420
10	24	5	552
11	22	7	462
12	21	10	420
13	20	13	380
14	20	13	380
15	22	18	462
16	16	13	240
17	20	15	380
18	20	14	380
19	16	12	240
Total	334	171	6794

5. Results and discussion

The study population is formed by the participants in the *Farmes'* dinners. Therefore, non-participants have not been mapped. According to the survey, 112 respondents turned out to be non-followers and 59 were followers. Through the *roster recall* questions, 3411 out of 6794 relations have been explored and characterised. In Table 6, these relations are classified according to the set definition reported in Table 3.

Though the questionnaire addressed the issue of information exchange, it did not enquire the very nature of the information and resources exchanged. However, a general knowledge of the case study allows to identify the following main topics in the information exchange: current farming, technical issues, best practices exchange and project expectations.

Table 6 Descriptions of the various sets of relations

Description	Set notation	Number of relations
Initial set of w-k-w relations (relations established <i>before</i> the social events)	X_f	136
	X_u	218
	$X_f \cup X_u$	354
Set of new w-k-w relations	N_f	194
	N_u	388
	$N_f \cup N_u$	582
Final set of w-k-w relations (the set existing <i>after</i> the social events)	T_f	330
	T_u	606
	$T_f \cup T_u$	936
Set of active relations	A_f	115
	A_u	151
	$A_f \cup A_u$	266
Set of permanent relations	D_f	268
	D_u	376
	$D_f \cup D_u$	644

The data shown in Table 6 represent the base to measure the impact of the V&Zapp' on the farmers' networks.

Verification of hypothesis H.1–growth. The data have been elaborated to calculate the SNA indexes, as described in section 3. These indexes have been calculated for each Farmers' Dinner, leading to 16 values for each index (Table 7).

Table 7 Social network indexes to measure network growth

Index	Before	After	Difference (% variation)
Number of Relations – (r)*	354	936	582 (1.64)
Average Degree – (ad)**	1.01	4.12	3.11 (3.08)
Density – (d)**	0.06	0.21	0.15 (2.50)
Component Ratio – (cr)**	0.69	0.36	-0.33 (-0.48)
Fragmentation – (f)**	0.85	0.5	-0.35 (-0.41)

* sum of relations for all 16 networks; ** average value obtained from the 16 networks

All the indexes exhibit the expected impact as foreseen in Table 4. First of all, r increased by a magnitude of 164%, verifying the *H.1*. This means that the format of the SI initiative enabled the participants to create new relations. There was no significant difference between the followers and non-followers in the creation of new relations (Figure 4). The average degree (ad) became more than four times greater than the *before* value. In other words, each participant had three new

acquaintances in average after the Farmers' Dinner, leading to an overall increase of 308%. As a consequence, the social networks became remarkably denser, with the density index increasing by 250% from the initial value of 0.06. The SI also reduced the isolation and fragmentation of the networks. The notable decrease in the component ratio (*cr*) by 48% indicates that the social networks became more open and democratic; and the reduction in fragmentation (*f*) by 41% implies that participants became less marginalised. In conclusion, all indicators confirm *H.1*, that is, actors involved into the SI initiative were enabled to interact and to increase their relations.

A visual representation helps to recognise the action of V&Zapp' in altering the networks of farmers. As an example, the diagrams (before–after) in Figure 3 display the evaluation of the network for Farmers' Dinner #15.

Figure 3 Development of network in Farmers' Dinner #15

Source: own elaboration, 2019

In terms of network alteration, the initiative produced the addition of two nodes (9 and 19) and 102 links (green lines), generating a final network of 136 relations. This caused an increase in network density, which passed from 0.07 to 0.38. This kind of result has been achieved, with various levels of alteration, in each of the other dinners. The values reported in table 7 depict the overall pattern of alteration in terms of network growth.

The operation of the SI was not limited to the creation of new relations, since it was also directed by their qualitative improvement, especially for followers (personally engaged in V&Zapp') with respect to non-followers (attendance to only one Farmer's dinner organized by V&Zapp').

Verification of hypothesis H.2–qualitative change. The engagement enabled followers to establish information exchanges and professional agreements due to the sharing of values, the convergence of expectations, and the raising of trust created by their interaction. As it emerges from Table 5, followers established 115 active relations out of 330 (34.8%) versus 151 out of 606 (24.9%) by non-followers, with a statistically significant difference ($p < 0.01$, see Figure 4).

Verification of hypothesis H.3–stabilisation. Followers reinforced their relations due to the engagement in the SI V&Zapp', leading to more durable relations compared to non-followers. This is proved by data in Table 5, showing that followers established 268 permanent relations out of 330 (81%) versus 376 out of 606 (62%) by non-followers. This difference is also statistically significant ($p < 0.01$, see Figure 4).

Figure 4 Fraction of relations by categories of actors

Source: own elaboration, 2019

Followers' relations versus non-followers' relations that turned into active relations: $p < 0.01$, $n = 936$ (two-sample test of proportions). Followers' relations versus non-followers' relations that became permanent: $p < 0.01$, $n = 936$ (two-sample test of proportions)

Finally, the SI initiative VàZapp' was able to qualitatively improve the local relational capital by transforming the existing and new relations into active relations, making them permanent. This implied also the improvement of the coordination among the actors since the networking activities promoted by Vàzapp' lead to entrepreneurship enhancement through new business formation (e.g. the formation a saffron production activity) and partnerships for research collaborations.

6. Conclusions

Rural areas are affected by a progressive depopulation process, which aggravates the geographical marginalisation from urban and metropolitan areas and worsens the wide equity gap in terms of job opportunities, life quality, public services, health care, and education level. In this regard, this paper has focused on the importance of social relations to combat rural marginalisation that, in many cases, causes land abandonment and desertification.

Far from neglecting the importance of public intervention in infrastructural investments in rural areas, this paper paves the way for the importance of the role of SI initiatives and social networks to create the condition for rural developments to rely on coordination and collaboration amongst farmers and between farmers and other formal and informal institutions (Villamayor-Tomas, 2019).

The analysis of the case study, reported in this paper, represents an opportunity to illustrate the state of the art on SI (i.e., definitions, basic mechanisms, methodology) and to propose a short and mid evaluation framework for measuring the impact of a SI initiative, i.e. VàZapp', by means of quantitative and qualitative indicators, some provided by the SNA methodology. As expected, the results prove that VàZapp', by organizing and implementing the format of Farmers' dinner, has (i) created new relations amongst farmers; (ii) enabled them to exchange immaterial resources, such as information, knowledge, know-how, expertise, and skills; and (iii) made their interactions more durable. Specifically, outcomes show that this SI initiative worked effectively, leading to a +308% in the number of relations and +250% in social network density. There is also an evident improvement in the quality of the social relations, especially in cases where there are direct engagements within the initiative, that is when the farmers participate, subsequent to the Famers' dinner, in other events, becoming followers of VàZapp'. The paper, indeed, proved that the Farmers' dinners turned out to be an effective tool for social network reconfiguration. They

strengthen the existing networks through the inclusion of new nodes and the creation of new links. Moreover, this tool also allowed to alter the very nature of the links by transforming them into active relations that can be used as a strategic resource for local development (see example the creation of one production cooperative and the formation of several professional collaboration agreements). The formation of new relations followed an anarchist development that emerged in response to the inputs of Vàzapp', preventing the possibility of planning and controlling the development of the network architecture. On one hand, this process leads to a notable network alteration employing minimum intervention, since it relies upon agent's self-organising ability. On the other hand, the nature of the process does not give room to network design. In other words, Farmers' dinners can be essentially used as first mover and process activation, while it is not suitable to control the network structure.

The short-term evaluation framework, proposed in this paper, may be useful for project managers and developers and monitoring agencies, in order to pursue SI effectiveness and efficiency. This framework has been applied to the case study to avoid uncontrollable changes of the network on a longer time span, and to have immediate answers on short-term effects. Thus, the measurement of further impacts is beyond the scope of this work. However, some socio-economic effects can be traced since the case study analysis revealed the formation of production cooperative, professional agreements and research consortia.

Finally, the authors stress the importance of enhancement of the social relations as highly relevant for the adoption of rural development policies. It is worth mentioning cooperation measures (e.g., Measure 16 of Rural Development Plan within the EU Common Agricultural Policy) aimed at solving the inefficiencies caused by the lack of coordination of innovation actors in rural areas (i.e., farmers, consultants, research institutions, government). SI may have a strong synergetic effect with this type of policy intervention. In addition, it may favour the empowerment of local communities in defining well-tailored strategies for local development according to an actual bottom-up approach. In this sense, SI may exert a boosting effect on other policy measures (e.g., infrastructure, education, health care, extension services, etc.).

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Figure 1

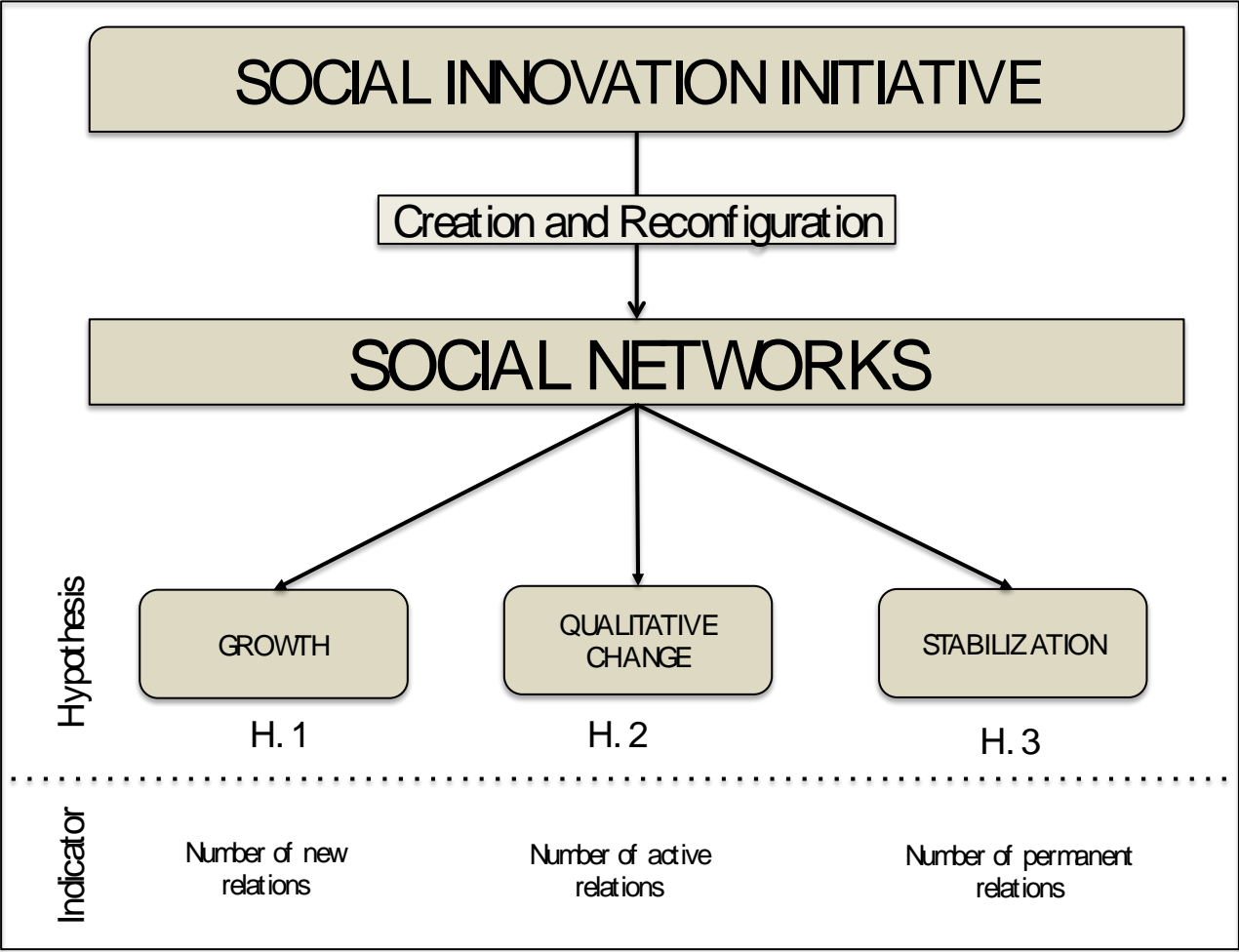


Figure 1

Caption and source are reported in the text.

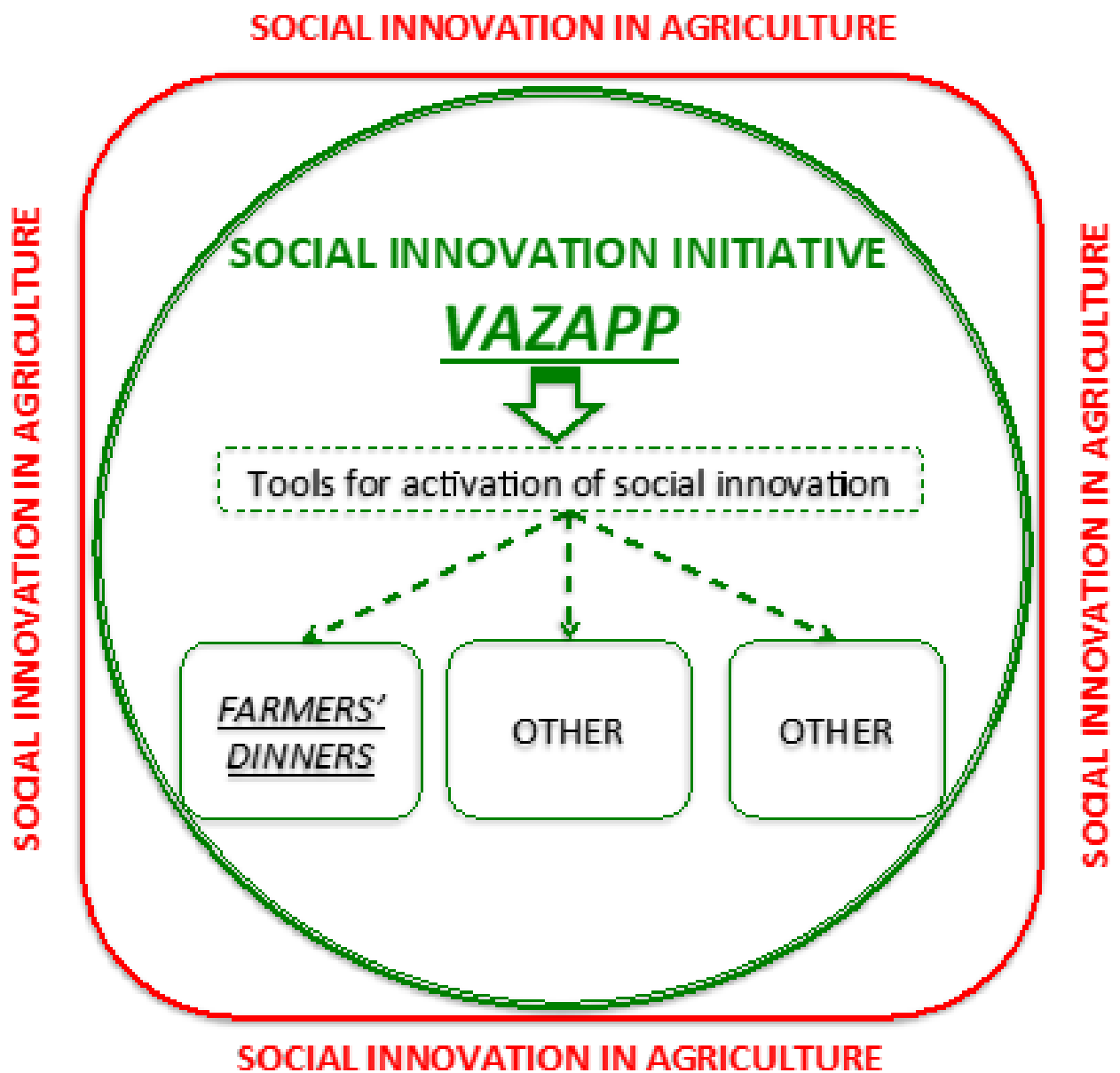


Figure 2

Caption and source are reported in the text.

Figure 3

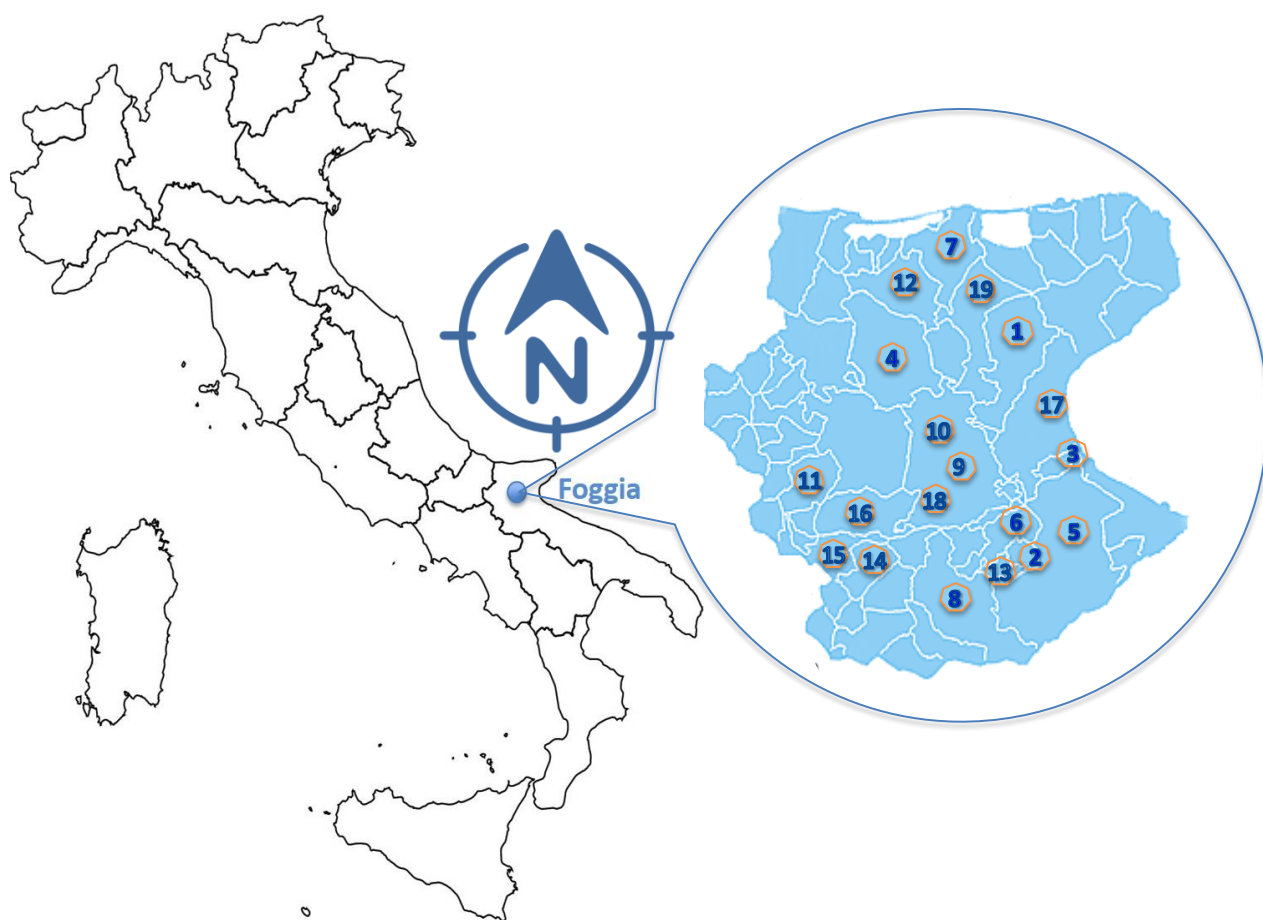


Figure 3

Caption and source are reported in the text.

Figure 4

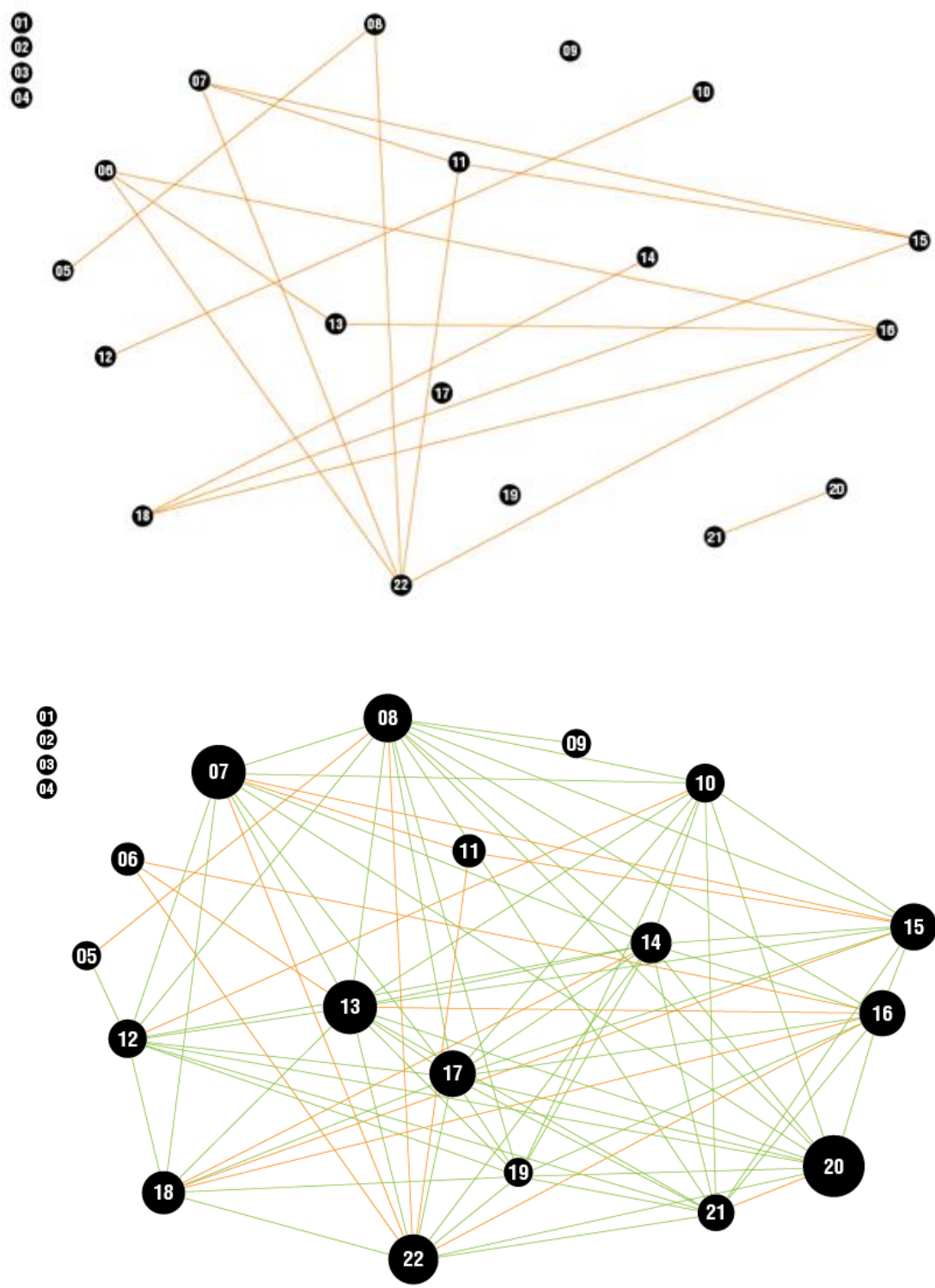


Figure 4
Caption and source are reported in the text.

Figure 5

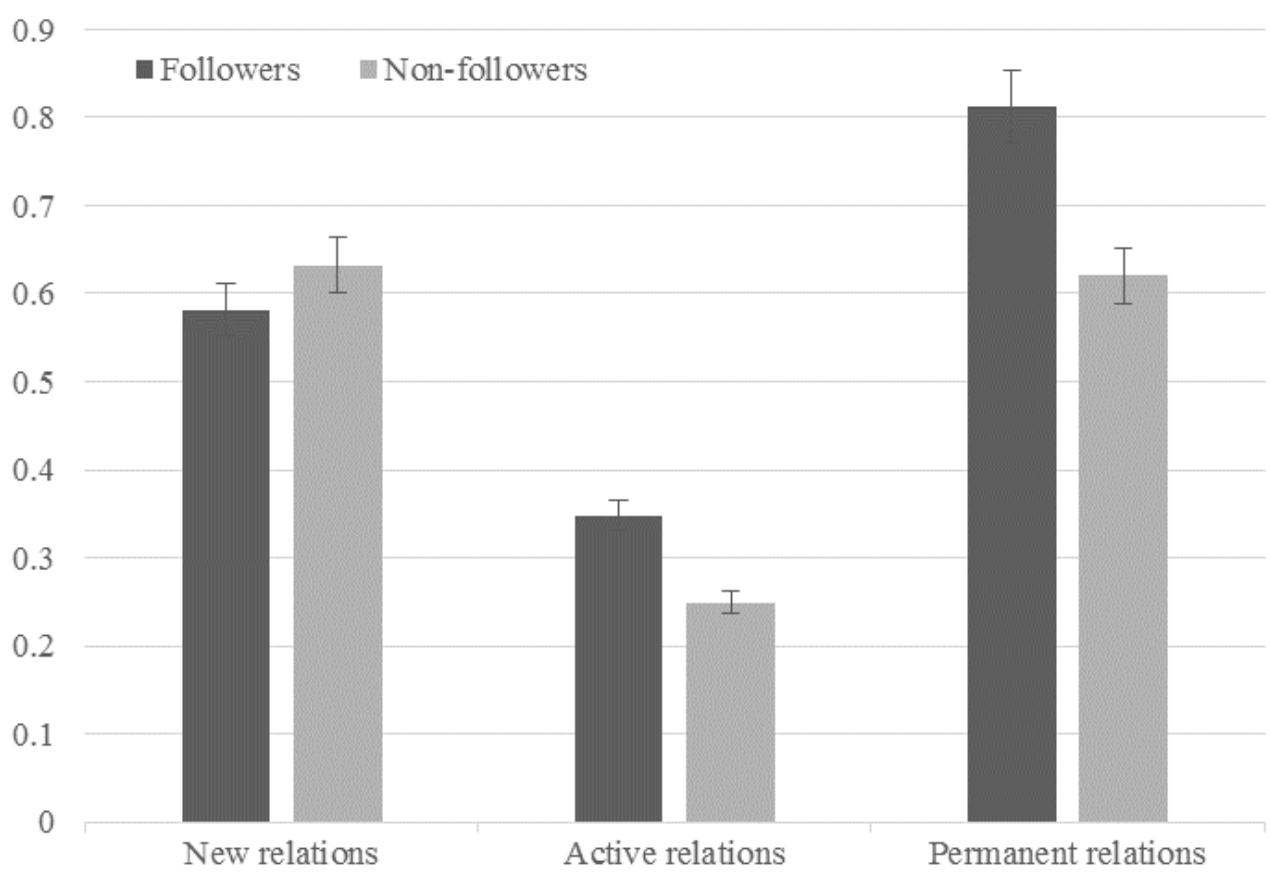


Figure 5
Caption and source are reported in the text.