Food Community Networks as Sustainable Self-Organized Collective Action: a Case Study of a Solidarity Purchasing Group

Giuseppina MIGLIORE[1], Francesca FORNO[2], Giovanni DARA GUCCIONE[3], Giorgio SCHIFANI[4]

Jel Classification: D62, O13, Q56

Abstract

The spread of Food Community Networks (FCNs) is mainly due to new and confirmed policies for consumption, testing new social paradigms aimed at promoting sustainable development in rural areas through the active reorganization of the agricultural and food industry. As a result, there is a set of rules deriving from complex relational structures competing to define self-organized collective action for sustainability. This paper analyses the structure of relations within FCNs. With this end in view, research on the experience of FCNs has been done, in particular of Solidarity Purchasing Groups (henceforth SPGs) in Sicily (Southern Italy). By applying Social Network Analysis, the article identifies what role each participant in the network plays; that is, who can influence long-term collective action.

Keywords: *natural resources, sustainability, cooperation, SNA.*

Résumé

La diffusion des Réseaux agro-alimentaires alternatifs (RAA) est principalement due à des politiques innovantes et robustes en faveur de la consommation. Celles-ci expérimentent de nouveaux paradigmes sociaux pour le développement durable dans les zones rurales, à travers une réorganisation active du secteur agricole et alimentaire. En effet, il existe un ensemble de règles découlant des structures relationnelles complexes qui définissent l'action collective auto-organisée pour la durabilité. L'objectif de cet article est d'analyser la structure des relations au sein des RAA. Une recherche a donc été menée sur l'expérience des RAA, en particulier sur les groupes d'achat solidaires (GAS) en Sicile (sud de l'Italie). En plus, en appliquant une Analyse du réseau social (ARS), le rôle que chaque participant joue dans le réseau est identifié en vue de déterminer qui peut influer sur une action collective de longue durée.

Mots-clés: ressources naturelles, développement durable, coopération, ARS.

Introduction

For several years, the development of the global market has contributed to concerns about food safety and environmental degradation, but above all it has encouraged long production chains in which food loses its identity and its cultural value. All this has led to the creation of new strategies in consumption policies focused on a complex quest for identity and social relations in the post-modern consumer (Soron, 2010). At the same time, they redefine a new alternative geography of food and new opportunities for small enterprises excluded from globalization (Murdoch *et al.*, 2000; Caniglia *et al*., 2008).

In the new emerging geography of food, the reincorporation of production processes and local consumption are spreading quickly, taking on different forms such as the so-called Alternative Food Networks (AFNs) (Sonnino, 2007) or the much less analysed Food Community Networks (FCNs) (Pascucci *et al.*, 2013). Forms of AFNs are, for example, Farmers' Markets and Box Schemes (Cicia *et al.*, 2011). FCNs are differentiated from AFNs in terms of their experiences; participants both share the benefits and cover the expenses of the organization. Examples of FCNs include CSA (Community-Supported Agriculture), more diffused in Northern Europe and the USA (Bougherara *et al.*, 2009), AMAP (Association pour le Maintien d'une Agriculture Paysanne - AMAP, 2012), an association supporting local agriculture in France, and Solidarity Purchasing Groups (SPGs) in Italy (Graziano and Forno, 2012; Migliore *et al.*, 2012).

FCNs originate in a specific social and cultural background, in which the objective of promoting economic sustainability by farmers and consumers as well as of the production and consumption of sustainable food is to increase social and democratic equity among all members of the community (Feenstra, 2002). Although from the economic point of view, the forms of commercialization identifiable with FCNs are only relatively significant, they are still important mainly due to their strong impact on the management of shared resources (Costanigro *et al*., 2011). The rules within FCNs differ from the mainstream as they experiment with new social paradigms and innovation system models (Migliore et al., 2015, 2014; Cembalo *et al*., 2013).

A common feature across the different forms of FCNs is an interesting relational structure that governs market transactions. However, while in the CSA and AMAP, as far as we know, this relational structure mainly involves farmers and consumers, in Italian SPGs there is a much more complex relational system that involves different types of actors (cultural and environmental associations, groups of organ-

[1] Giuseppina Migliore (Ph.D) - Department of Agricultural and Forest Sciences, University of Palermo, email: giuseppina.migliore@unipa.it.
[2] Francesca Forno (Researcher) - Department of Humanities and Social Sciences, University of Bergamo, email: francesca.forno@unibg.it.
[3] Giovanni DARA GUCCIONE (Ph.D) - Italian Institute of Agricultural Economics (INEA), email: daraguccione@inea.it.
[4] Giorgio SCHIFANI (Full Professor and Research Coordinator) - Department of Agricultural and Forest Sciences, University of Palermo, email: giorgio.schifani@unipa.it.

ized consumers, farmers, etc.). At the local level, in fact, SPGs are often at the centre of a much more complex network structure which involves actors that share an explicit ambitions of territorial governance, similar to what happens in the Anglo-Saxon movement of Transition Towns (Grasseni, 2013). In other words, these networks represent the typical 'grassroots innovations' for sustainability (Forno and Graziano, 2014), in which individual actors and organizations experiment with new solutions to common problems.

These forms of FCNs represent particularly important cases because they allow for the construction and consolidation of relations of reciprocity which favour the management of natural resources at local levels with satisfactory long-term outcomes (Migliore *et al.*, 2014). However, while research conducted on SPGs has shown that these groups represent important sources of social innovation capable of suggesting effective solutions to the problems of the unsustainability of the agro-industrial system, to date it is still not clear which actors and roles within the network influence the promotion of long-term sustainable consumption and production.

To develop a more inclusive view of how such influences are established within the network, this article draws on the evolutionary theory of collective action (Ostrom, 2000, 2010a). In such theory, the conditions which affect the likelihood of individuals bringing about collective actions to overcome social dilemmas in the management of shared resources are analysed. Among these conditions, the way in which the individuals are linked via a network has proven very important in triggering collective action (Prell *et al.*, 2009). In fact, it is a commonly held opinion that individuals who are linked in a network are more likely to contribute to each other's welfare (Granovetter, 1973; Ostrom, 2010a).

The aim of this study is to map the relationships within a SPG network to understand which of the actors who participate in collective action have a major influence on the promotion of sustainable consumption and production.

The hypothesis behind the present study is in fact that the capacity of a SPG to diffuse and produce long-term collective actions is the result of the strategies of specific actors in possession of relational capital (quality and number of relations). More precisely, it is presumed that the higher the number of relationships that each actor or group of actors establishes within the network, the more significant is the actor's capability to impact the growth of sustainable consumption. Following this line of reasoning, it is possible to identify the key actors and their roles within the collective action. In line with Ostrom's evolutionary theory of collective action, we presume that the number of relationships was built over time.

With this in mind, the article takes a relational approach and analyzes in detail the system of relations between one specific SPG named Gasualmente, which constitutes one of the most active SPGs in the region of Sicily (Southern Italy), and other actors (both individual and collective actors). For this reason, Social Network Analysis (SNA) was applied. In the literature, environmental application of SNA was used to understand those characteristics of social networks that increase the likelihood of collective action and successful natural resource management (Prell *et al.*, 2009).

As the analysis of the findings below will show, the relational approach allows us to observe and identify the most important relationships, in terms of the existence, diffusion and duration of FCNs. Based on the number of relationships, it is in fact possible to infer the influence that each actor develops within the network, identifying those actors who play a key role in stimulating long-term collective actions.

Collective Action through Food Community Networks

As is well known, the subject of the management of resources used in common has often dealt with "the tragedy of common resources" (Hardin, 1978) and the "prisoner's dilemma" (Dawes 1973), stressing how individuals tend to optimize their own interests to the detriment of common benefits. Moreover, the constant use of the environment due to inadequate production strategies and consumption demonstrates how difficult it is to find a method that makes it possible to curtail the use of material resources to ensure long-term economic survival.

The difficulty of encouraging individuals to pursue a solution that provides common benefit rather than a focus on their personal interests was also demonstrated by Mancur Olson (1965), who in the *Logic of collective actions* stressed that a possible benefit for the group as a whole is not significant enough to generate a collective action aimed at achieving that advantage. According to Olson, once goods have been produced, someone who cannot be excluded from taking advantage of it will not contribute voluntarily to providing the goods. This is why the majority of solutions for managing common resources call for an external actor, identified by state or private institutions (Hardin, 1978). However, we may notice on a global scale that neither the state nor the market has been able to guarantee a continuous and prosperous use of natural resources over the long-term. On the contrary, as shown in many of the empiric cases studied by Ostrom (1991, 1998, 2010b), there are examples of common self-governed properties that have been able to use common resources in a sustainable way and which have achieved significant long-term outcomes.

Several studies have shown that it is possible to manage common resources better and in a more sustainable way when they are managed with the involvement of economic actors who rely on interdependence (Ostrom, 2000; Ostrom and Walker, 2005). The social norms deriving from participative negotiation tend to reduce the problem of *free-riders*

because they are grounded on reciprocity and trust, while simultaneously contributing to them in a certain way.

From the evolutionary theory of collective action, we know that certain conditions are necessary in order to promote collaboration and sustain cooperation among various actors (Ostrom, 2010b). Such conditions pertain both to the characteristics of the social environment (also called the 'structure of opportunity', like the institutional framework, for example) where an emerging self-organizing action takes place and develops (Adger, 2003; Ostrom, 2008, 2010c). More precisely, among the conditions predicted to affect the likelihood of collective action, face-to-face communication and how individuals are linked to one another in a network are among the most important (Ostrom, 2010a). In general, communication allows for building a sense of solidarity, which enhances the likelihood of individuals keeping their promises to cooperate (Kerr and Kaufman-Gilliland, 1994). In fact, communication helps to increase "the trust that individuals acquire when promises are made to them in a face-to-face setting" (Ostrom, 2010a: 158). How individual are linked in a network is another important condition that affect collective action. In fact, if the structural linkages are that of a pure hierarchy, it is presumed that the dilemma disappears through the exercise of command and control mechanism (Granovetter, 1973; Ostrom, 2010a). It follows that individuals who are linked in a network where each individual contributes resources to other individuals through unidirectional linking are more likely to contribute to each other's welfare.

In addition, as illustrated by Ostrom (2000), a self-organized collective action may be initiated due to the presence of 'conditional co-operators', i.e., individuals "willing to initiate cooperative action when they estimate others will reciprocate and repeat these actions as long as a sufficient proportion of the others involved reciprocate" (p. 142). The presence of a recognized figure who may play the role of the initiator – for example, proposing an initial model of organization to improve joint outcomes – may help to enhance cooperation, because his/her reputation increases others' trust. In other words, when some individuals initiate cooperation, others learn to trust them and are more willing to adopt reciprocity themselves, leading to higher levels of cooperation (Ostrom, 2010a).

In order to be sustained over time, self-organized collective actions should determine their own membership. The presence of a clear "boundary role" (Ostrom, 1991) is fundamental for the development of greater trust, reciprocity and mutual monitoring among the various actors in the network. This allows participants to know who's in and who's out of a defined set of relationships, and thus with whom to collaborate (G□chter *et al.*, 1999). From the evolutionary theory of collective action, it is possible to infer that the growth of individual cooperation over time may be measured by the number of relationships developed.

From several points of view, FCNs (like SPGs) are developing forms of self-organization and self-governance in the context of collective resources. Indeed, FCNs create potential common benefits related to the demand for agricultural products and food, which is more and more often conditioned by environmental, ethical and food safety reasons (Murdoch *et al*., 2000; Cembalo *et al.*, 2012).

FCNs represent a potential answer to a model of society increasingly perceived as unsustainable, and are directly determined though choices and actions taken jointly by producers and consumers (Schifani *et al.*, 2011).

Like other forms of collective action in the context of collective resources, as recent empirical evidence has started to show (Migliore *et al.*, 2014), SPGs require their members to participate actively in the management of the group by taking part in the creation of norms as well as in the organization of convivial activities, etc. SPGs participants develop, define and carry out collective programs combining ethical and solidary principles. The relationships established among the participants of SPGs facilitate the circulation of resources, fundamental for mobilization (information, tasks, and material resources) and for creating common interpretations of reality. They simultaneously provide preconditions for the development of collective action and the deployment of specific lifestyles. In other words, SPGs represent particular systems of relationships in which social norms allowing for the management of natural resources at local level with satisfactory long-term outcomes are created as a by-product of a social exchange (relationships) among the actors involved in the economic exchange. The success of collective action seems due to the actions of specific actors, in terms of their ability to engage in many relationships with other participants. This enhances a socio-economic system aimed at improving the quality of life, and favours the development of the local economy as the basis of sustainable development.

As emphasized in the evolutionary theory of collective action, face-to-face communication among members is an important condition, which is achieved in FCNs (Graziano e Forno, 2012). In SPGs, the maintenance of relationships that are based on trust and reciprocity is determined by regular meetings to further support the relationship. When specific problems arise, these are solved through intense discussions that either solidify the trust or mark the end of a relationship (Graziano and Forno, 2012).

As the following analysis will show, SPGs try to achieve their principal aim – to re-embed production, distribution and consumption within new socio-economic relationships (Schifani and Migliore, 2011) by setting in motion a series of social mechanisms which ensure adherence to roles that exist by virtue of the mutual reciprocity created among the different actors in the FCN.

The study and its context

Description of the case study

The phenomenon of SPGs is continuously growing in the region of Sicily: at present, there are an estimated 50 active

groups, a strong increase especially starting from 2007 (49%). The spread of this phenomenon in the region can be attributed to few groups promoting an alternative and relationship-based economy (Migliore *et al.*, 2014). The specific SPG analysed here, named Gasualmente, was set up in 2009 and since then has been particularly active among the regional SPGs. It was founded by two professors from the Department of Agriculture and Forestry Sciences at the University of Palermo, who played the role of "initiators" or "conditional co-operators". As other SPGs, the principal mission of Gasualmente was to promote the constitution of a Solidary Economy Network in Palermo and beyond. Gasualmente SPG promoted innovative solutions aimed at stimulating consumption and sustainable production of agricultural products and food in the region. In its first year of activity, Gasualmente SPG was able to involve about 70 families and to form economic ties with 12 Sicilian farms that supply local organic products. Monthly purchases reached almost 6,000 euros (with weekly highs of 1,500 euros, 40% of which were fruit and vegetables, 38% meat, 9% dairy products).

In 2010, Gasualmente was also one of the promoters of the ATS 'A Fera Bio', which organizes a monthly fair for the sale of organic local products at the university yard area (there are five fairs, located in the Sicilian cities of Palermo, Catania, Messina, Caltanissetta and Enna). The fair's market space characterizes itself not just as a commercial but as a cultural space where cultural activities aimed at spreading sustainable consumption are organized, allowing the citizens to immerse themselves in the historical and monumental heritage of Palermo. Finally, in order to spread the consumption of local organic products in Palermo and its surrounding metropolitan area, Gasualmente, in collaboration with a number of local producers, in 2011 started a home delivery service to meet the needs of those who wish to support the initiative, but would have difficulty to come and buy products in person, which could prove time-consuming.

Research design and data collection

As mentioned before, self-organized networks like SPG are based on a system of relations in which each participant plays a role that we assume is determined by its position in the network, as well as on the number of mutual ties every participant is able to form and maintain with others within the network.

To identify the relational system around Gasualmete SPG, the technique of snowball sampling was used (Noy, 2008). Starting with Gasualmente consumers, we reached and interviewed other actors (Alter) involved in the system (other SPGs, associations, and farmers, etc.), which were indicated by those that were progressively contacted. The survey was concluded when it was felt that a sufficient number of actors within the network had been identified (theoretical saturation). The procedure adopted actually created a boundary for the elements of the network[5]. 34 actors were interviewed (Gasualmente consumers included). Data was collected from face-to-face interviews to identify the type of social ties (relations) structured by Gasualmente consumers and various actors, and among actors.

More precisely, six types of relations were identified, from which it was possible to categorize the actors (Alters) into six categories (Table 1):

– Type of relation - i. - Economic and social exchange to promote sustainable production and consumption - this type of relation generates the first category of actors;
– Type of relation - ii. – Relationship to build awareness of environmental and cultural issues in order to drive critical consumption - it represents the second category of actors;
– Type of relation - iii. – Relationship to create local district of solidarity economy and sustainable consumption – such relationship includes all SPGs with which Gasualmente consumers established relations;
– Type of relation - iv. – Relationship to intermediate farmers and stimulates knowledge – this type of relation includes the two professors who founded Gasualmente SPG;
– Type of relation – v. – Financial and social exchange to promote new events, and projects to support the spreading of sustainable consumption. It is associated with the fifth category of actors;
– Type of relation – vi. – Relationship to develop ethical and responsibility practices to spread sustainable consumption, also at the regional and national levels.

In order to study such system of relations, we have used Social Network Analysis (SNA). The analysis followed an Ego-network approach[6] through which it was possible to identify the structure of local relations which Gasualmente consumers were able to form with Alters.

In the analysis below, we have decided to consider only the actors (Alters) with which Gasualmente had bi-weekly interactions, because, as often pointed out, it is through frequent interactions that reputations and mutual monitoring are created (Poteete and Ostrom, 2004).

The collected data were then organized into a square matrix (also known as an adjacency matrix). In each cell of the matrix, binary values that indicate the presence or absence of relations between Ego and Alters and Alters alone were inserted. More precisely, the value of the cell is equal to 1

[5] We are aware of the fact that, in the social sciences, saturation of such a relational network is virtually not possible. It is a matter of weighing the benefits and costs of using a quantitative method of analysis. One of the potential costs is having to define the boundaries of a system. Nevertheless, we feel that with the use of snowball sampling, a large enough number of system elements is detected to be able to perform an analysis in which the essential elements are presumed to have been captured.

[6] We have chosen an Ego-network approach because it was demonstrated that Gasuamente network is part of a complex relational system with other SPGs in the Sicily region (Migliore *et al*., 2013). Ego-network approach allows to describe the way in which the actors are embedded in "local" social structures.

Table 1 - Alter names and labels.

Category	*Alters*	*Relationship Type*	*Label*
1	Local and organic food fair staff in the city of Palermo	i.	Food_fair_PA
	Local and organic food fair staff in the city of Catania		Food_fair_CT
	Gasualmente home delivery service		Home_delivery
	Farmers' association in local and organic food fair in Palermo		Farmers_fair
	Farmers' association of Gasualmente		Farmers_SPG
2	Association on agriculture ethics	ii.	Ethics_ass.
	Environmental group "Legambiente"		Environmental_ass.
	Cultural association		Cultural_ass.
	Italian Association Organic Agriculture		AIAB
	Politic Consumerism Association "Siqillyah"		Consumerism_group
	"Feltrinelli" bookstore		Bookstore
3	"Mondello" Solidarity Purchasing Group	iii.	SPG 1
	"Sperlinga" Solidarity Purchasing Group		SPG 2
	"Espace" Solidarity Purchasing Group		SPG 3
	"le Nuvole" Solidarity Purchasing Group		SPG 4
	"Bio…logico!" Solidarity Purchasing Group		SPG 5
	"Riportiamo alla luce" Solidarity Purchasing Group		SPG 6
	"BibiGas" Solidarity Purchasing Group		SPG 7
	"A tutto GAs" Solidarity Purchasing Group		SPG 8
	"Gastone" Solidarity Purchasing Group		SPG 9
	Solidarity Purchasing Groups Association in Palermo Province		InterSPGs Palermo
4	Professor 1 of Agriculture Department	iv.	Initiator.1
	Professor 2 of Agriculture Department		Initiator.2
5	Agriculture Department Head of University of Palermo	v.	Agricultural_faculty
	Events Office of University of Palermo		Unipa_staff
	Ethics Bank		Ethics bank
	Regional Agriculture Department of Food resources		Food_department
6	Network of Solidarity Economy in Sicily	vi.	Sicily_RES
	Social Farms network		Social_farms_net.
	Italian Solidarity Purchasing Groups network		Italian_SPGs_net.
	Sicilian Solidarity Purchasing Groups network		Sicilian_SPGs_net.
	Green Economy network		Green Economy_net.
	Network to promote waste reduction		Waste_0_net.

if relations exist among the actors and equal to 0 if relations are absent, therefore indicating no communication among actors.

[Table 1 – Alter names and labels]

In this specific case, every actor is represented by a dot (node/actor), while the relations among the actors (as the collaboration) are represented by bidirectional lines. The collaboration, which is the subject of the research, is a reciprocal relation. The resulting data were then analysed in UCINET. The graphic depiction of relations in Social Network Analysis is based on the Graph theory (Figure 2)[7].

For the purposes of this study, a set of measurements were used, specific to the analysis of the ego-network that allows us to identify the positional roles, and thereby the local influence, of Alters[8]. From this, it is possible to infer the probability of influencing the action of Alters, through the reciprocal relationships established between them and the Gasualmente consumers.

Results

In order to analyse the relational roles in the *Gasualmente* network, we checked the level of cohesion of the Ego-network by analyzing its density. However, in an Ego-centred graph, it is advisable to calculate the total density of the network omitting the actor on which the attention has been focused. The density is a structural trait of a network and it depends on the relation between existing ties inside the network and those that are likely to be formed. For a non-oriented graph, we have:

$$\Delta = \frac{L}{\left[N(N-1)/2\right]} = \frac{2L}{N(N-1)}$$

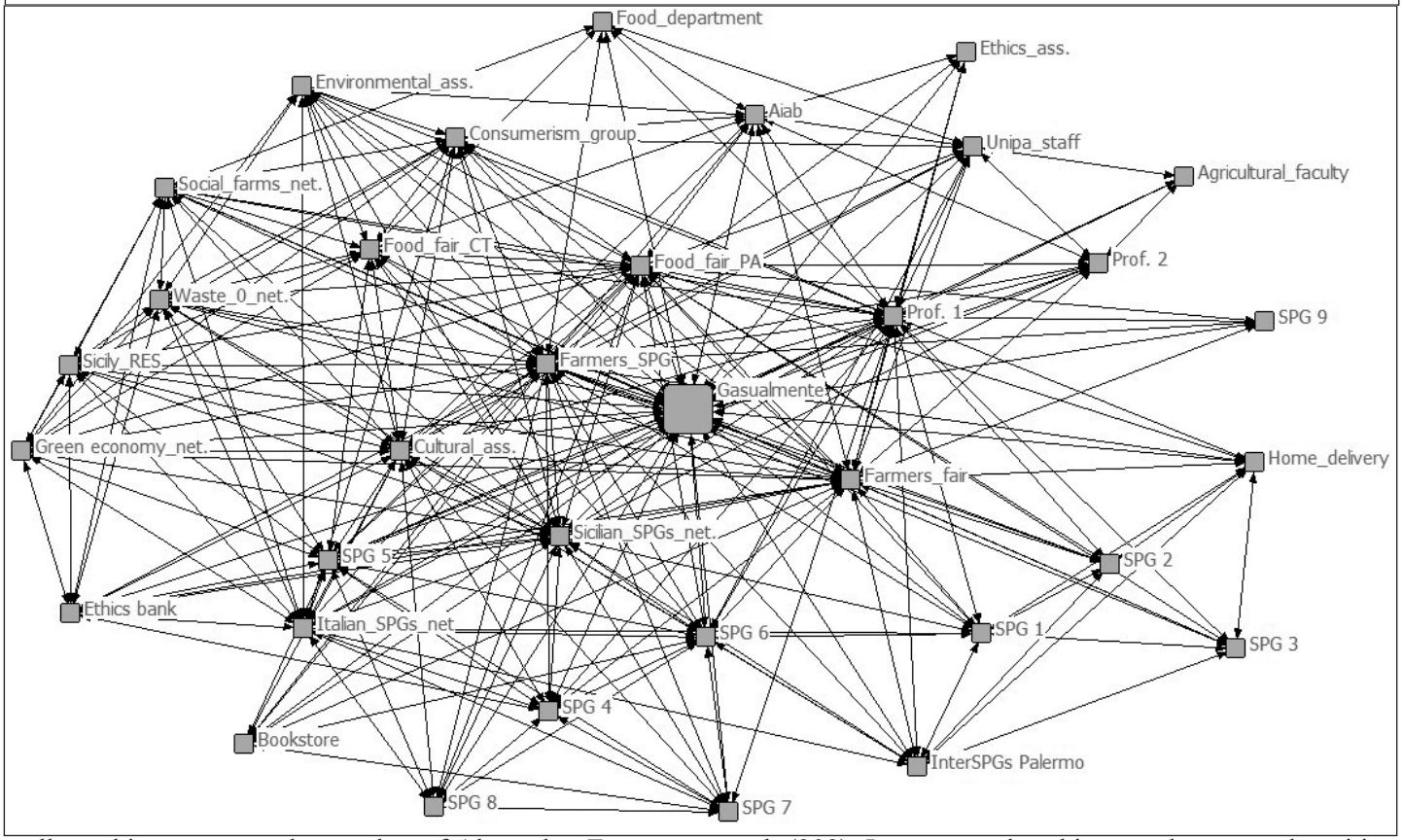
Where, L shows the number of ties in the network, while N(N-1) is the maximum number possible. In our specific case, the total density value for Gasualmente SPG was 0.44. This outcome, which varies from 0 to 1, shows that from the 1130 possible ties, 44% (498) are active. In other words the value of 1130 corresponds to the number of bonds present in the network if all the nodes were connected to each other. In general, a network is defined as having low cohesion (or as a large mesh network), when density values are between 0 and 0.40; of average cohesion when these values are in the 0.40 to 0.60 range; and of high cohesion (or meshed network), when the density value is between 0.60 and 1 (Trobia and Milia, 2011).

With regard to the measurements of local influence (the first group of measures), the following were calculated: *size,* obtained from the number of nodes (Ego included), identifying the number of nodes every actor is directly connected to; the number of *ties*, that is the number of mutual relations between the Ego and the Alters within the network; the number of possible ties (pair) for all the Alters in the network that enable the measurement of the 'relational likelihood'. Also, the following were calculated: *average distance* that represents the sum of the shortest average distance between each of the pairs in the Ego network, along with their efficiency. *Reach efficiency* was calculated as

[7] Here, we relied upon the most frequently used graphic tool, the sociogram. Although in an intuitive way, it enables us to better understand the dynamics of relations in a network.

[8] UCINET software, version 6.357, was used for the mathematical elaboration of the data, and NETDRAW software version 2.114 for the matrix transposition in the graphs (Borgatti, S.P., Everett, M.G. and Freeman, L.C., 2002).

Figure 1 - *Gasualmente Sociogram*.



well, as this represents the number of Alters that Ego can reach within two steps, thereby measuring the number of secondary contacts the nodes are able to reach through every primary tie. In other words, the *reach efficiency* measures the size of 'secondary' information for every actor in the network; the higher the value, the smaller the information coming directly from each actor. Finally, *Ego Betweenness* index was calculated. This indicates the frequency with which an actor lies in the shortest path (geodesic) of all pairs of actors in the network. In the SNA, the Betweenness index is considered an important indicator of the ability of an actor to control and mediate the exchange of information within the network.

These calculations have enabled us to identify the positional roles of those actors that contribute more, in order to determine the information within the SPG. The values reported in Table 2 are the expression of the centrality of the Alters, which is a function of the real ties that each Alter has with the rest of the network.

In particular, as it is a reasonable assumption, the Gasualmente consumers are at the centre of network. They are the basis of the SPG's existence and its relational system within the network.

Inside the Ego-network of Gasualmente SPG, the player *Initiator 1*, who is a professor at the Department of Agriculture and Forestry Sciences, plays an important role due to the high number of nodes to which he is related (27) and to the large number of ties he has formed within the network (309). It suggests that this actor has a good position within the network and

is able to influence the success of collective action. Furthermore, the *Ego-betweenness* value (representing the second most important value in the network) indicates that this actor not only surpasses others in terms of his knowledge-base about many farmers, managing consumers, and the many organizational aspects of the SPG, but that he is also an important source for the transmission of information to the Alters of the network. The player *Initiator 1* could be considered as a conditional co-operator (Ostrom, 2000), as he was Òwilling to initiate cooperative actionÓ during the initial phase of the SPG. More precisely, from the results we can infer that he was an important source of support to the founding of Gasualmente SPG, while during later stages he provided (through knowledge and information) consumers with the opportunity to manage a durable collective action.

Additionally, it was possible to identify the role of local influence played by the informal association of agricultural producers that are members of Gasualmente (acronym Farmers_SPG). In this specific case, the outcomes make us think that the producers' role, in conjunction with consumers from SPG, is to transmit values aimed at promoting sustainable production and consumption – a role which is certainly more complex than the simple delivery of agricultural food products. Therefore, the association of producers plays a decisive role in Gasualmente network not only be-

Table 2 - *Some of the key local influence measures.*

	Size	*Ties*	*Pairs*	*AvgDis*	*ReachE*	*nEgo Betweenness*[1]
Gasualmente consumers	33	432	1056	1.60	6.92	14.43
Farmers_SPG	32	430	992	1.56	6.96	8.40
Initiator 1	27	309	702	1.56	8.09	13.05
Farmers_fair	27	323	702	1.54	7.93	9.88
Food_fair_ PA	25	297	600	1.50	8.19	10.16
Cultural_ass.	24	329	552	1.40	7.89	5.46
Sicilian_SPGs_net.	24	327	552	1.41	7.95	6.00
Italian_SPGs_net.	19	214	342	1.37	9.91	6.39
SPG 5	19	229	342	1.33	9.38	4.77
SPG 6	17	185	272	1.32	10.19	4.15
Consumerism_group	16	188	240	1.22	10.19	2.92
Food_fair_CT	16	176	240	1.27	10.68	4.23
Green economy_net.	15	181	210	1.14	10.86	1.32
Waste_0_net.	15	180	210	1.14	10.86	1.40
Social_farms_net.	15	166	210	1.21	10.78	3.28
Sicily_RES	14	160	182	1.12	11.30	1.21
Aiab	13	112	156	1.28	13.36	4.84
Environmental_ass.	13	134	156	1.14	11.54	4.95
Unipa_staff.	12	94	132	1.29	14.04	1.64
InterSPGs Palermo	12	101	132	1.23	13.75	4.16
SPG 1	12	105	132	1.20	13.69	3.19
SPG 4	12	114	132	1.14	12.94	1.84
Ethics bank	12	117	132	1.11	13.25	1.46
SPG 7	11	99	110	1.10	14.60	1.28
Initiator 2	10	69	90	1.23	15.28	5.46
SPG 8	10	83	90	1.08	15.28	0.98
Bookstore	9	67	72	1.07	15.57	0.89
Home delivery	9	68	72	1.06	17.93	0.69
SPG 2	8	53	56	1.05	18.64	0.77
SPG 3	8	53	56	1.05	18.64	0.77
Food_department	7	33	42	1.21	22.30	5.32
Ethics_ass.	5	20	20	1.00	25.00	0.00
SPG 9	5	20	20	1.00	22.92	0.00
Agricultural faculty	4	12	12	1.00	40.24	0.00

[1] In this table the Ego-betweenness is normalized (i.e. the ratio between the ego value and the maximum value of the network).

cause of the number of nodes to which it is linked (*size* equal to 32) and the number of mutual relations (*ties*), but above all because of the efficiency of transmitted messages (*reach efficiency*) and for the interesting value of Ego-betweenness, which emphasizes the importance of mediating information within the network.

It follows that also the informal association of producers from 'A Fera Bio' has a high number of contacts in the network (*size* equal to 27 and *ties* equal to 323). What is more, in the case of Gasualmente SPG, the ties with certain of the networks are particularly important: Sicilian Solidarity Purchasing Group Network (Sicilian_SPGs_net.), Italian Solidarity Purchasing Groups Network (Italian_SPGs_net.), Green Economy Network (Rete Green Economy), Network to promote waste reduction (Waste_0_net.), and Social Farms network (Social_farms_net.). Cultural associations, just like other SPGs and environmental associations play an important relational role inside SPGs. From this point of view, the following are particularly important: Cultural Association, Political Consumerism Association 'Siqillyah', the Italian Association of Organic Agriculture (AIAB) and the Environmental Group 'Legambiente' (Table 4). These are primarily aimed at building awareness of environmental and cultural issues in order to drive critical consumption.

In brief, the cultural and symbolic capital of every Alter conditions and is conditioned inside the network by the numerous mutual ties they form (Leahy and Anderson, 2010). It is believed that this conditioning role is more efficient in better-connected actors (Burt, 2002).

In summary, these results emphasize that the collective action within Gasualmente network is mainly conveyed by actors that are able to reciprocate and to repeat relationships as long as a sufficient proportion of the others involved reciprocate. The relational capital of these actors aims to promote sustainable food production and consumption, either at a local level or on a national scale. An overall interpretation of the results shows, however, that the actors who have an abundant capital of relations are also crucial for the continuation of collective action; in fact, their removal may compromise the effectiveness of the network itself.

Conclusions

Today we have a global food system in which the distance between the point at which the food is grown and the point at which it is consumed is large. At the same time, foods being grown are considered raw materials for processed products, so consumers are experiencing problems in getting freshly grown food. This system has a negative impact also for small farmers in rural communities who are often defeated by a market governed by harsh rules that are perceived to be out of their control.

As argued before, FCNs are a particular type of self-organized collective action whose goal is to find a new cooperative form for sustainability based on the active participation of actors involved in agriculture and food production and consumption. This form of participation practiced by consumers and producers' could remarkably contribute to the diffusion of new sustainable lifestyles and to the confirmation of a new paradigm of development based on agricultural, eco-compatible, multifunctional models and on sustainable consumption. These experiences represent a possible solution to the dilemma encompassing those consumers and producers that are actively seeking to build an economic model founded on human relations. It's noteworthy to mention that a growing number of consumers seek nowadays direct relations with producers and support critical consumption as a way to express social discontent to pressurize and protest peacefully against the economy based on overconsumption and incontrollable waste production (Graziano and Forno, 2012). In

the similar vein, producers also increasingly seek to turn from a market that is more controlled by multinational companies to a more sustainable system that is based on better management of natural and social resources and strongly anchored to the local areas.

Our understanding has deepened the structure of relations of a particular FCN that offers various innovative solutions to these problems that could provide a useful cognitive framework for public and private institutions aimed to financially support the survival and the spread of such collective action for rural development.

The case we have examined showed that SPGs relations are not limited to consumers and producers only, but it tends to involve other actors who play a fundamental role in spreading new sustainable style of consumption. As regards to relations that these actors structure within the network, it arises that the most important are aimed to build awareness on environmental and cultural issues in order to diffuse critical consumption, as well as to stimulate knowledge about sustainable production so to promote local *district* of solidarity economy. These relations are structured by different economic and social actors, such as: cultural associations, educational institutions and university professors, consumerist associations, informal networks of small-scale producers. The evolution of such relational structures formed within FCNs enables the formation of self-organized collective action for sustainable development in the area. This relational system plays an important role as in such experiences a better redistribution of economic resources among actors is allowed together with a mutual cultural exchange that increases awareness for the preservation of common resources and the local territory. In so doing, these experiences represent interesting solution to the contemporary problems of rural development, which are jointly produced by consumers and producers in the pursuit of a model of society based on participation, sustainability and human relations.

The analysis of structural and relational traits of the Gasualmente network, based on the application of a specific set of network analysis indexes, has shown that it consists of various actors highly dependent on each other. Nevertheless, the analysis of the network has also identified some of the central actors with decision-making autonomy who play an important role in coordinating the initiatives (Gasualmente consumers, farmers associations and initiator 1). As highlighted, conditional co-operators provided a crucial resource within the network to escape out from the Ò-tragedy of the commonsÓ, spontaneously forming a protective shield between them and the defectors.

Our case study could be described as a typical grassroots example of a self-governing common resource which guarantees sustainable development and enables significant and lasting outcomes. It also confirms that better and more sustainable management of common resources can be achieved when actors are directly involved in the management of such resources (Ostrom, 2010).

The policy implications of such bottom-up responses are clear especially in the context of rural development, whose goal is to promote competitiveness, sustainable management of natural resources, and the balanced development of rural areas.

Indeed, such information may be important to different political institutions (regional, national or European) that are engaged in resource management or rural development initiatives, which aim to influence the behaviour of some categories of actors. As seen, the growth of SPGs in Sicily is directly attributed to the ability of self-organized consumer networks to involve many different actors, not only farmers, but also cultural and environmental associations as well as institutions, to share new solutions to sustainability problems. However, it should be emphasized that promoting and maintaining collective action is quite resource demanding and requires major organizational commitments. Therefore, the role of political institutions should be that of accompanying these processes in order to facilitate the networking activities through the creation of food and agriculture policies that promote local food production, sustainable processing and consumption, etc.

In accordance with EU regulation 1305/13 and in particular with article 5, comma 3, in fact, rural policies should promote local markets and short supply circuits. Although these forms of FCNs arise often as reactions to the inefficacy of political institutions, they may indeed represent important experiences on which to base an integration of intents between European institution and local communities. As the case of Gasualmente has clearly highlighted, cultural associations, educational institutions as well as other social actors are fundamental to spread a different culture to cement new practice of production and consumption. After all, the call for sustainable development needs to be based on new civic values as well as new forms of participation.

Further advancement in FCNs research should take into account wider geographical area and other social and cultural contexts. This is obviously needed to test the validity of our empirical findings and its degree of generalization.

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