PROJECT NETWORKS FUNDED BY LEADER ACROSS EUROPE
A proposed evaluation approach based on Social Network Analysis

Elena Pisani[1] (corresponding author) elena.pisani@unipd.it

Catherine Laidin[2] catherine.laidin@agrocampus-ouest.fr

Mauro Masiero[1] mauro.masiero@unipd.it

Laura Secco[1] laura.secco@unipd.it

Davide Pettenella[1] davide.pettenella@unipd.it

Abstract

The paper proposes a method to evaluate the project networks funded by Rural Development Programmes (RDPs) through local development strategies of the LEADER/CLLD method. By using Social Network Analysis (SNA), the paper proposes the Sub-Density Indexes (S-DIs) related to specific dyadic relationships among members, partners and beneficiaries of projects financed. The S-DIs contribute measuring the change in the organisational structure of the project networks evidencing the dynamism in the central positions by different actors (i.e., members, partners, and beneficiaries) and in different programming periods considered.

Keywords: *LEADER, Community-led Local Development, project, evaluation, Social Network Analysis,*

1. Introduction

From the ’90s, LEADER has pooled a new governance framework among public and private actors by promoting integrated local development strategies, innovation and economic diversification and has fostered inter-territorial and transnational co-operation based on a participatory and bottom-up approach (Ray, 2006; Pollermann, 2013; Chevalier and Dedeire, 2014). For these distinctive features, LEADER has been included within the family of the neo-endogenous approaches to rural development (Cloke et al., 2006, Navarro et al., 2016; Navarro et al., 2018).
These intertwined elements require distinctive attention by external evaluators to accurately evaluate the contribution of the LEADER initiatives to the objectives of the Rural Development Programmes, and by Local Action Groups (LAGs) to self-evaluate the delivery mechanism and added values as improved governance, improved social capital, and enhanced RDP results and impacts (EC, 2017). In the 2014-2020 programming period, REG. n. 808/2014 (Annex V)

[1] Affiliation: Department of Land, Environment, Agriculture and Forestry (TESAF), University of Padova, Viale dell’Università, 16 – 35020 Legnaro PD (Italy)
[2] Affiliation: Agro-campus Ouest, UMR6590 ESO F-35043 Rennes (France)

specifies the Common Evaluation Question for LEADER: "To what extent RDP interventions have supported local development in rural areas (CEQ n. 17)?".
Therefore, the paper proposes and applies a method to evaluate, in an ex-post exercise, the networks of projects financed by Rural Development Programmes (RDPs) through the LAGs of the LEADER/CLLD, by using indexes and graphs of Social Network Analysis (SNA).
The paper proposes and applies the Sub-Density Indexes (S-DIs) concerning specific types of dyadic relationships among members, partners and beneficiaries of projects. These indexes contribute to measure the extent to which rural development programmes have supported local development strategies of LAGs. More specifically, the indexes focus on the project relations among different typologies of actors involved in project initiatives financed in a specific programming period. Possible applications of the method are two-fold: longitudinal analyses in different programming periods, and cross-sectional analysis within the same programming period.
After this introduction, section two highlights the method proposed, while section three presents the results of the longitudinal analysis applied in a case study in Italy and the cross-sectional analysis performed in two case studies in France. Finally, section four presents conclusions and suggestion for possible improvements.

2. Method

Actors involved in LEADER projects – as members and partners of the LAG, and as beneficiaries – are part of several institutional and social networks. Actors' connections in projects, financed by the different measures of the RDP, characterise the relational dimensions of their activity. As a result, the projects establish a grid of direct and indirect relations, which allows using Social Network Analysis (SNA) as an appropriate tool to describe the network structure (Wasserman and Faust 1994, Borgatti et al. 2013). Different authors have applied SNA to the analysis of LAGs structures and relations, but the focus has mainly been on the members' network (e.g., Nardone et al., 2010; Chevalier and Razafimahefa, 2013). To our knowledge, researchers have not paid attention in using SNA to the entire set of relations, inclusive of partners and direct beneficiaries as well.
By analysing the network of local development projects of a defined LAG, different kinds of nodes emerge as members, partners and direct beneficiaries. These actors are related to each other through project ties. The squared matrix presented in table 1 classifies the different types of actors' relations employing a simple combination of all the possible dyadic categories of nodes.

Table 1. Classification of ties in LEADER projects

	Members	**Direct beneficiaries**	**Partners**
Members	MM	MB	MP
Direct beneficiaries		BB[3]	BP
Partners			PP

Source: own elaboration. The project structure is characterised by undirected relations. In LEADER project relationships involving only PP do not exist.

[3] Based on SNA principles, individual beneficiaries not participating in joint projects with other actors are isolated nodes. Thus, they are mathematically excluded in the density computation.

Table 1 helps to identify specific indexes able to capture the extent to which RDP interventions have supported local development in rural areas, counting the number of relationships activated during a specific programming period among distinctive categories of actors, and elaborating these data by using SNA.
Specifically, in this work, attention has been given to the density index defined as the proportion of all ties that are effectively present in the network over those that could be present (Borgatti et al., 1997) (1)

$$(1) \quad D_n = \frac{\mathrm{Tot(n)}}{\left[\frac{\mathrm{N(N-1)}}{2}\right]}$$

Where Tot(n) is the total number of ties effectively present in the network and N is the number of nodes in the network. The density index varies between 0 (i.e., no relations are present in the network) to 1 (i.e., all the potential relationships among nodes are effectively present).
In the entire project network of the LAG, the density of each type of relationship is computed with a formula. Table 2 analyses how much the RDP measures activated through LEADER promote relationship building among members, partners and beneficiaries, according to their potential opportunities. In other words, by highlighting the real or actual relationship activated thanks to the project over the potential ones, sub-density indexes provide a quantitative measure of how much the RDP interventions have supported local development in rural areas by sustaining effective project relations.

Table 2. Sub-density indexes of project relations among LAG members, partners and beneficiaries

Sub-density indexes	Formula	Description
MM density	$D_{mm} = \frac{\mathrm{mm(n)}}{\mathrm{P_{mm}}}$	Project ties among members mm(n) over the total number of ties that could be present among members ($\mathrm{P_{mm}}$). Where $\mathrm{P_{mm}} = \frac{\mathrm{M(M-1)}}{2}$ and M is the number of members in the network.
MB density	$D_{mb} = \frac{\mathrm{mb(n)}}{\mathrm{P_{mb}}}$	Project ties among members and beneficiaries mb(n) over the total number of ties that could be present among them ($\mathrm{P_{mb}}$). Where $\mathrm{P_{mb}} = \mathrm{M} * \mathrm{B}$.
MP density	$D_{mp} = \frac{mp(n)}{P_{mp}}$	Project ties among members and partners mp(n) over the total number of ties that could be present among them ($\mathrm{P_{mp}}$). Where $\mathrm{P_{mp}} = \mathrm{M} * \mathrm{P}$.
BB' density	$D_{bb} = \frac{\mathrm{bb(n)}}{\mathrm{P_{bb}}}$	Project ties among beneficiaries bb(n) over the total number of ties that could be present among beneficiaries ($\mathrm{P_{bb}}$). Where $\mathrm{P_{bb}} = \frac{\mathrm{B(B-1)}}{2}$ and B is the number of beneficiaries in the network.
BP density	$D_{bp} = \frac{\mathrm{bp(n)}}{\mathrm{P_{bp}}}$	Project ties among beneficiaries and partners bp(n) over the total number of ties that could be present among them ($\mathrm{P_{bp}}$). Where $\mathrm{P_{bp}} = \mathrm{B} * \mathrm{P}$.

Source: own elaboration.

The sum of the sub-density indexes – adjusted for the weight of the potential relationships of a specific dyadic category of actors over the total potential relationships of the network – is equal to the density of the entire project network financed in a specific programming period as equation (2) specifies.

$$(2)\ D_N = \frac{(D_{mm} * P_{mm}) + (D_{mb} * P_{mb}) + (D_{mp} * P_{mp}) + (D_{bb} * P_{bb}) + (D_{bp} * P_{bp})}{(P_{mm} + P_{mb} + P_{mp} + P_{bb} + P_{bp})}$$

D_{mm} is the density of members' relations, and P_{mm} is the weight of their potential ties. D_{mb} is the density of members-beneficiaries' relations, and P_{mb} is the weight of their potential ties. D_{mp} is the density of members-partners' relations, and P_{mp} is the weight of their potential ties. D_{bb} is the density of beneficiaries' relations, and P_{pp} is the weight of potential ties. Finally, D_{bp} is the density of the beneficiaries-partners' relations, and P_{bp} is the weight of their potential ties. The sum of all the weights has to be equal to 1 and the sum of all the weighted density has to be equal to the density of the network.
The sub-density indexes allow comparing a specific LAG over different programming periods in a longitudinal analysis by avoiding the evaluation problem regarding data comparability over different programming periods, which evaluators typically have when LAGs change the membership compositions. Network analysis quickly solves this criticism adding or deleting specific relationships. Moreover, these indexes enable to compare the performances of different LAGs in a cross-sectional analysis, by comparing different project networks in different local territories where LEADER applies.

3. Results and findings

The sub-density indexes have been computed in three LAGs selected as case studies and located in Italy and France: namely Venezia Orientale in the Veneto region for the longitudinal analysis, and Ouest Cornouaille in the Brittany region and Pays d'Arcachon Val de l'Eyre in the Aquitaine region for the cross-sectional analysis. Table 3 specifies the distinctive features of each organization for the 2007-2013 programming period, detailing the territorial surface, population involved in the local development strategy, number of municipalities, degree of urbanization following the OECD classification, year of establishment, legal status, number and type of members involved, and the public and EARDF spending.

Table 3: Key features of the case studies in the programming period 2007-2013

Variables	Unit	Venezia Orientale	Ouest Cornouaille	Pays d'Arcachon Val de l'Eyre
Total surface	Km²	930	662	1 470
Total population	2010-2012	157 028	90 349	141 433
Municipalities	Number	16	39	17
Degree of urbanisation	OECD type	Intermediate region	Rural region	Urban region
Operativity since	Year	1995	1986	2003
Legal status	Type	Association of public and private members	Association of 4 inter-municipalities associations	Association of 3 inter-municipalities associations
Members	Number	47 Public: 33 Private: 14	48 Public: 22 Private: 26	17 Public: 8 Private: 9
Public spending (used in Italy, just indicative in France)	Euro	6 191 000	2 522 624	2 818 182
EARDF (used in France)	Euro	2 724 040	1 387 353	1 550 000

Source: own elaboration based on the Local Action Plans of the different organizations considered.

3.1. Longitudinal analysis of the case study in Italy

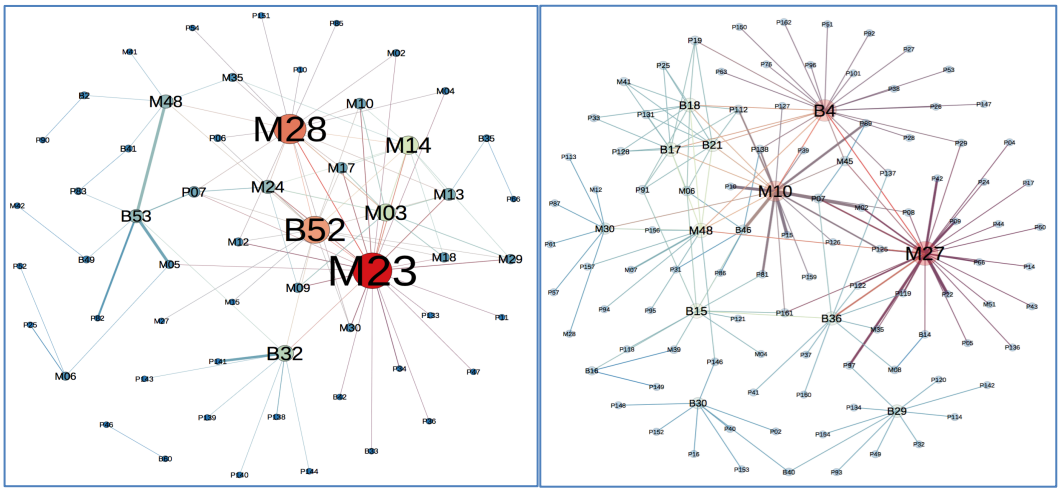
Time is needed to create or increase the endowment of projects relations from one programming period to the next, as we can observe with the Venezia Orientale case study (see Table 4 and Figure 1). In LEADER II, 161 relations were present among members, partners, and beneficiaries, while in LEADER+ 210 relations took place. Despite the increase in the absolute number of relations, their density decreased from 0.122 in LEADER II to 0.078 in LEADER + (-36.09%). Moreover, a longitudinal change in the project network took place: weighted density substantially decreased in MM relations (-87.4%), and MB relations (-57,13%). Besides, the index increased by a significant amount in MP (+106.88%), BB relations (+79.66%), and slightly increased in BP relations (+14.33%).
Therefore, in the longitudinal assessment from LEADER II to LEADER+, the dynamics of project network highlight the enhanced weighted density of project relations among members with partners and among beneficiaries, instead the weighted density among members collapsed as well for members with beneficiaries.

Table 4 S-DI indexes in the Italian case study

S-DI	**LEADER II**					**LEADER +**					***Change (%)***
Actual (A) Potential (P) relations	Values		Density	Weight	Weighted density	Values		Density	Weight	Weighted density	Weighted density
	A	P				A	P				
MM	70	253	0.277	0.192	0.053	18	112	0.161	0.042	0.007	**-87.40**
MB	40	230	0.174	0.174	0.030	35	192	0.182	0.071	0.013	**-57.13**
MP	18	552	0.033	0.418	0.014	76	1328	0.057	0.493	0.028	**+106.88**
BB	3	45	0.067	0.034	0.002	11	66	0.167	0.024	0.004	**+79.66**
BP	30	240	0.125	0.182	0.023	70	996	0.070	0.370	0.026	**+14.33**
Network	**161**	**1320**	**0.122**	1.000	0.122	**210**	**2694**	**0.078**	1.000	0.078	**-36.09**

Source: own elaboration

Figure 1: Project networks of the Italian case study in LEADER II (left) and LEADER + (right)



Source: own elaboration based on GEPHY©. The thicker the tie, the higher the number of projects jointly developed.

By comparing the whole networks of projects in LEADER II and LEADER +, we observe that members in central positions in the LEADER II move towards peripheral positions in LEADER +. The number of nodes with a central position within the network enlarges from one

programming period to the other to include both members and beneficiaries in central positions, while partners situate in outer parts of the network. In some cases, regarding LEADER+, partners act as brokers of different projects (see P161; P138; P122) facilitating or reinforcing relations between MB.

3.2. Cross-sectional analysis in France

The LAG Ouest Cornouaille has been established in LEADER II, while LAG Pays d'Arcachon Val de l'Eyre has started its operativity in LEADER 2007-2013. Despite the different historical paths, the two LAGs attest in LEADER 2007-2013 a quite similar performance in terms of density of projects relations. Specifically, in the LAG Ouest Cornouaille, the number of actual relations is 241 over a total potential number of 2145, while in the LAG Pays d'Arcachon Val de l'Eye the number of actual relations corresponds to 202 over a total potential number of 1927. Consequently, the density is 11.2% in the first LAG and 10.5% in the second one.

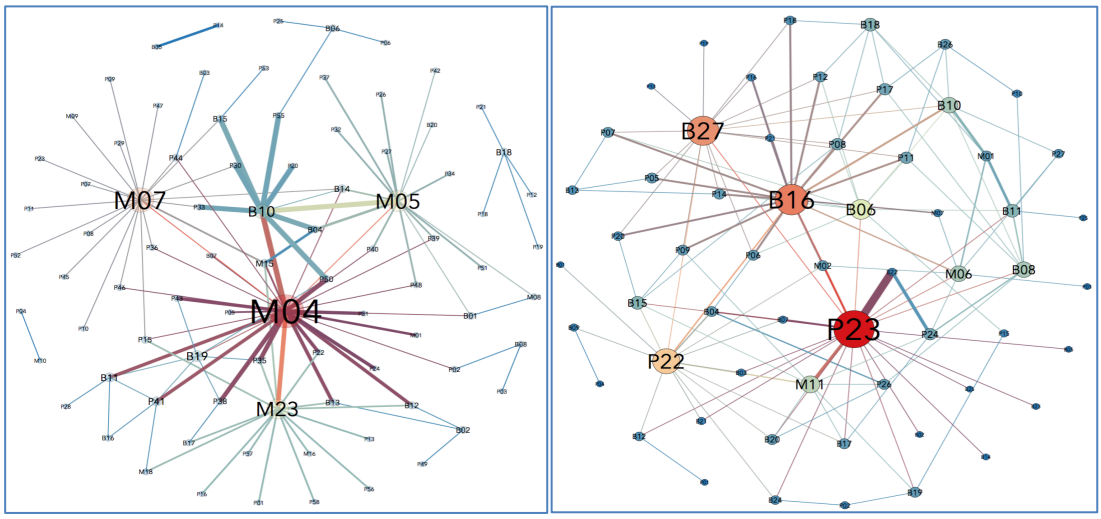
Table 5: S-DI indexes in the French case studies in LEADER 2007-2013

S-DI	***Ouest Cornouaille***					***LAG Pays d'Arcachon Val de l'Eyre***				
Actual (A) Potential (P) relations	Values		Density	Weight	Weighted density	Values		Density	Weight	Weighted density
	A	P				A	P			
	23	55	0.418	0.026	0.011	4	91	0.044	0.047	0.002
MM	47	209	0.225	0.097	0.022	19	378	0.050	0.196	0.010
MB	100	627	0.159	0.292	0.047	17	378	0.045	0.196	0.009
MP	17	171	0.099	0.080	0.008	11	351	0.031	0.182	0.006
BB	54	1083	0.050	0.505	0.025	151	729	0.207	0.378	0.078
Network	241	2145	0.112	1.000	0.112	202	1927	0.105	1.000	0.105

Source: own elaboration

A closer look at the S-DI depicts two different strategies of actors' organisation in the two LAGs. In LAG Ouest Cornouaille the weighted density of relations among project actors differ depending on the type of ties considered: it is shallow for BB (0.008), it progressively increases for MM (0.011), MB (0.022), and BP (0.025) and it finally reaches its highest value for MP (0.047) where the majority of relations takes place (100 over 241). In LAG Pays d'Arcachon Val de l'Eyre, the weighted density of relations presents a distinctive organizational path compared to the previous case: deficient in MM (0.002), it progressively increases for BB (0.006), MP (0.09), MB (0.010), and it finally reaches its highest value for BP (0.078) where the majority of relations are set (151 over 202).

Figure 2: Project networks of *the LAG Ouest Cornouaille (left) and LAG Pays d'Arcachon Val de l'Eyre (right) in LEADER 2007-2013*



Source: own elaboration based on Gephy ©

In LEADER 2007-2013 the local actors have selected two different ways of organising their projects related to the local development strategies. In the Ouest Cornouaille LAG, members and partners play central roles, while in the Pays d'Arcachon Val de l'Eyre LAG, the relations among beneficiaries and partners are crucial in shaping the structure of the network. This result is also visible in figure 2 wherein the left part (Ouest Cornouaille LAG) specific members and their connected partners play central positions (M04, M05, M07 and M23), while in the right part (Pays d'Arcachon Val de l'Eyre) beneficiaries (B16, B27, B10, B06) and partners (P23 and P22) are placed at the centre.

Conclusions

Longitudinal analysis evidences the evolution of projects' ties among different type of actors. Cross-sectional analysis evidences different structures of project networks, depicting different implementing and organisational strategies used by different actors.
The evaluator can observe changes in the organisational structure of project networks, evidencing the dynamism in the central positions of the network by different types of actors. The evaluator can understand how different project networks perform when embedded in the same governance structure.
The method can improve by including the flow of financial resources among the project actors. At present this specification is not present in the available database, but LAG managers typically have access to these data, allowing to better represent not only the structure of the project network but also the financial flows among different actors.

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