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Influence of Socio-economic determinants on the active involvement of agents implementers of Social Innovation: the Case Study of V`aZapp' in Apulia region

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1. Introduction and objective

Nowadays it is more and more common to hear about Social Innovation in agriculture. SIMRA¹ defined Social Innovation (SI) 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.”

The literature review provides some research work about the SI in agriculture to recreate a conceptual framework that understands innovation processes as the outcome of collaborative networks where information is exchanged and learning processes happen (Mulgan et al., 2007; Knichel et al., 2009; Bock B.B., 2012). They argued that technical and economic factors used to analyse drivers and barriers alone are not sufficient to understand innovation processes.

In this context, cannot be ignored as a convincing example of SI in Italy the movement V`aZapp'. It is a rural hub aiming at creating career opportunities for young people in a rural area with 58% unemployment rate in the 15-24 age. It is based on the satisfaction of the collective needs, it is characterized by the ability to increase the social capital, and it is to be able of self-sustaining from an economic point of view. It should be a "cultured" and short supply chain (Lombardi M., 2017). V`aZapp' merges the experiences of young farmers with other local talents, from economists to designers, from communicators to chefs. They design and implement ideas to enhance agri-food products, to increase the sustainability of rural practices and to innovate (Martina M., 2017).

In this paper, we develop a novel discriminant framework, which allows to integrate the socio-economic determinants of the potential beneficiaries in the SI into

¹ Social Innovation in Marginalised Rural Areas (SIMRA), a project funded by the European Union's Horizon 2020 research and innovation programme.

the discrimination process. Specifically, we formulate the socio-economic characteristics of all the participants to social events organized by V&Zapp' as a variant two-stage discriminant framework to capture the users' characteristics as well as their latent social connections. The experimental results on real-world data could show that our method can effectively predict the active participation of agents implementers in the SI. Moreover, estimation will allow to perform different groupings within V&Zapp' community, depending on the degree of active involvement in innovative cooperation activities.

2 Data

2.1 Case study

V&Zapp' is a rural hub and a community of professionals, researchers, communicators, creative talents that joins thanks to the will of Don Michele de Paolis (Salesian priest died in 2014), with the aim of creating a path that brings out the agricultural and agro-food sector through young people. It promotes jobs and territorial identity, social relationships in order to valorise the rural areas. Therefore, its mission is to reinterpret the agro-food and the territory contributing as a social activator and innovation broker. V&Zapp' is the result of the union of: i) a non-profit association, called "Terra Promessa", with the purpose of social promotion, founded in January 2014; ii) and a social cooperative, called "Terra Terra", with the purpose of offering services for agriculture, tourism and related sectors, founded on July 2016. V&Zapp' identifies itself as an absolute novelty in the national and international context because thanks to social-innovation models (registered formats), among which contadinner®, filiera colta® (cultural supply chain), facilitates relationships among stakeholders with a bottom-up approach, Additionally, it stimulates the cooperation and the creation of positive knowledge flows, favouring a different strategy model of economic development in agriculture and agri-food.

2.1 Survey description

The survey was carried out during the time in which the twenty contadinner took place, from the December of 2015. Questionnaire was distributed at the participants of each contadinner, organized in the different farm of province of Foggia, at the end of

talking time and before the dinner, and a dataset of 300 interviews was gathered. Data was obtained by a questionnaire prepared ad hoc with thirty questions, both open and close. The questionnaire was composed of the following sections: a) socio-demo information; b) event satisfaction information; c) needs and difficulties of farms.

The survey covers stated intentions about the willingness to be involved in the follow-up of V&Zapp' and to willingness to participate at least at another event organized by V&Zapp' team. The questions were formulated considering two different aspects of follow-up, about the will to host a contadinner in the future in the own farm and the consensus to receive news and updating from V&Zapp'.

It should be noted that data concerning the first step were gathered the intentions to participate and to be involved in the follow-up of V&Zapp', while data about the second step were gathered directly through an interview with two experts of V&Zapp' movement, which were asked how many and which people have closed a formal or professional agreement thanks to VaZapp'. Questions about the intentions to be an hypothetical host for the future contadinner, were formulated to farmers by picturing a perfect scenario under both space and structures to host at least thirty people in own farm. In the same time of talking and questionnaires, some characteristics picture were made in order to recorder and immortalize some typical and spontaneous moments. Some opens question administered to the participants were about the motivation and the why they were in agriculture, in which each respondent was free to explain all the motivations about his choice to entry, to continue or to come back in ow farm and often come back in own city.

3 Methodology

3.1 Two-stage model

Assessment of evolution and spread of SI in rural context is receiving more attention in the literature meanwhile a small number of works are available on determinants influence in the decision of agents implementers to join to the social network and to the SI.

This work aims to forecast the willingness to be involved in the follow-up of V&Zapp' activities and the willingness to stipulate formal or professional agreements. To do this, a two-stage analysis model was used. It seems that until today there is no

work in the scientific literature that has used a given methodology to analyse the development and the evolution of a social innovation.

These work id based on the choice of potential followers in the hypothesis of profits' maximization of decision-makers through the use of the two stage model:

1 step) whether or not to continue to follow V`Zapp' social activities;

2 step) whether or not to stipulate a formal agreement within V`Zapp' network.

In this work, the model has been adapted as the two stage model, given that it is not applied to an economic good but rather to a SI, which could be associated much more to the concept of public good than to a private economic good. Every agent is not faced with a choice to buy or not an economic good and his following willingness to pay, but he is faced with a choice whether to follow and adopt a SI, by investing time and by sharing ideas and experiences. Therefore, the agents involved, in which the majority are farmers, are not called to decide whether to buy or produce goods on the base of merely economic considerations, but they have to make a choice on the base of other considerations, such as the potential and probabilities of success they could have by adhering to a social innovation.

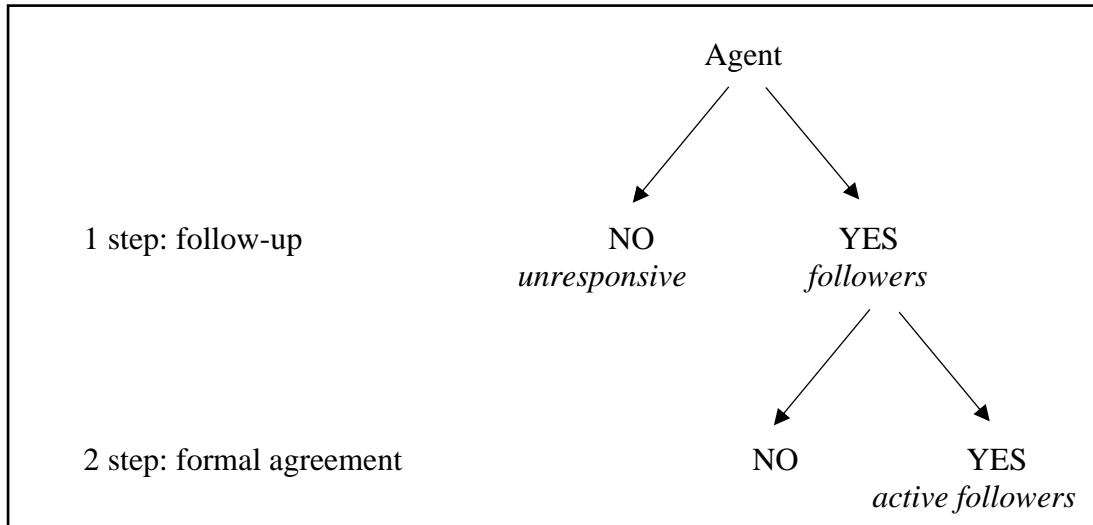
These considerations could determine limits in the application of the *two stage model*.

On the basis of the considerations and assumptions made so far, the structure of the *two stage model* has been modified and adapted in a different way as illustrated in figure 1.

In the first phase, each agent is faced with a binary choice (yes / no) and decides whether or not to be involved in the follow-up of V`Zapp' activities, understood as SI. In this phase, the decision-maker basically decides whether to share and entrust part of his project and idea to the V`Zapp' network. It should be noted that, since it is a network, those who decide to be part of it must share their ideas with other agents, but at the same time also others agents must share with him their ideas and innovative projects.

In the second phase, only the agents who in the first phase are willing to follow V`Zapp' are faced with a second binary choice: whether to arrive or not at a formal or professional agreement with V`Zapp', which effectively reinforces the relationship in the network between the subjects involved in the same formal agreement.

Figure 1. Sequence of steps



The choice of the agent to follow VàZapp', and therefore to be part of this new social network, is represented by the generic equation:

$$1) \quad W_i = f(V_j)$$

where V_i represents the utility function containing the independent variables that explain the choices of the agent.

3.2 Choice analysis and Probit model

Based on the information provided by the survey above described, two probit models are fitted to identify key determinants of the willingness to be involved in the follow-up of VàZapp' and to achieve formal and professional agreements by the agents of contadinner. Two empirical regressions are run to detect factors determining their intentions and whether these factors are recurrent or changing in two steps.

Recalling the equation 1 $W_i = f(V_j)$ where the choice depends on the utility function associated to the choice made, each individual will tend to choose the alternative with greater utility U . Utility maximization concept could be explain by the concept in which

an individual n , faced with a choice among different alternatives j , by associating a given utility per each choice available (Manski and Lerman, 1977).

For each individual, the utility will be given by the equation:

$$2) \quad U_j = V_j + \varepsilon_j$$

where:

U = utility of the choice made (yes or not)

V_j = is the deterministic component and what a researcher can observe;

ε_j = is the stochastic error and unknown to the researcher..

Given that each individual will tend to choice the best alternative (yes or not) in function of utility associated, we have:

$$3) \quad U_{ni} > U_{nj} \text{ for each } i \neq j$$

Thanks to this information, it could be possible analyse which are the independent determinants able to influence the choice of a single individual.

In our case study, we try to explain to choice made by the agents, which have had the possibility to know the SI of V&Zapp' thanks to the invitation to a contadinner, through an equation more articulated. In addition to the utility component, the final equation embodies also the socio-economic component and the marginality component.

Therefore, the equation 1, by using the Heckman's two-step estimation (Heckman, 1979), and by considering a sample of N observations, it can be rewrite in the following way:

$$4) \quad W_{i1} = \alpha_1 + \beta_j X_{i1} + \beta_j U_{i1} + \beta_j M_{i1} + \varepsilon_1$$

$$5) \quad W_{i2} = \alpha_2 + \beta_j X_{i2} + \beta_j U_{i2} + \beta_j M_{i2} + \varepsilon_2$$

where W_i symbolizes the dichotomous dependent variable, in which an attendance chooses whether to continue to follow V&Zapp' initiative and decide to follow it; X_i represents the list of socio-economic variables considered for each individual, U_i represents the perceived utility by the individual i , directly connected with the event in the first stage and with the SI in the second stage. Finally ε symbolizes the errors term, so all the variables and factors that could be inferred in the final choice of the attendance.

In the two-step estimation, the equation 2 exists only for those observations where $W_{i1} > 0$, who are the attendances willing to follow the activities of V&Zapp' and shared its vision, and W_{i2} symbolizes the dichotomous dependent variable in reference to have stipulate or not a formal agreement or a professional agreement with at least another agents of V&Zapp'.

Both stages will be estimated by maximum likelihood as independent probit model to determine the individual decision participation to the social events and the active involvement in the social innovation. Finally, the probability to be an active follower, directly involved in some projects, cooperation or formal agreements, is due by the joint probability to belong to the *followers* and to the *active followers*.

We fitted the model adopting a backward procedure, in which the definitive variables considered in the model are the results of a screening activity in the initial saturated list of variables. Starting from model with all the variables, the fit of the model is tested after the elimination of each variable. In this way, the evaluation of the best model is done according to ability to fit the data. The removal of a variable is able to vary the likelihood ratio chi-square of the model that is the parameters to verify the degree of fit of the model. When the elimination of another variables leads to a decreasing of likelihood ratio, the analyses is complete and it is not possible delete some variables from the model.

The independent variables considered as determinants of farmer's behavior are listed in the Table 1.

Socio economic determinant is composed by the independent variables related to age, gender, education, know or not V&Zapp' before the contadinner and the motivation why they are in agriculture. Utility component is represent by the satisfaction of degree about the relationship established during the vent of the contadinner, while the marginality component is represented by the difficulties that the farmers declared in the questionnaires and the distance from Foggia city. By knowing the parameters of different variables per each farm interviewed, and by knowing their choice in term of willingness to follow or not V&Zapp' news and events, it is possible to apply a probit model for both choices made in two different stages.

Table 1: List of variables used as determinant

Obs.	Code	Variable description	Coding	Mea n	S.D.	Freq.
300	Age	Years old	-	38.43	10.90	-
300	Gen	Gender	female male	-	-	17.5% 82.5%
172	Edu	Education level (five levels)	1= Primary school 2= High school 3= Bachelor 4= master's degree 5= PhD	-	-	13.95% 44.77% 13.95% 19.77% 6.40%
300	Distance	Kilometers far from Foggia city	-	46.70	45.52	-
201	KVZ	Know V&Zapp' before contadinner	0 = no 1 = yes,	-	-	23.26% 76.74%
300	Relation		-	4.75	0.57	-
269	Diff_1	Difficulty in creating new sales channels	-	4.23	0.95	-
266	Diff_2	Difficulty in improving technical and design skills	-	3.85	1.08	-
262	Diff_3	Difficult to introduce quality products	-	4.18	0.99	-
300	Pass	People that are in agriculture thanks to passion	0 = no 1 = yes	-	-	66.67% 33.33%
300	Trad	People that are in agriculture thanks to tradition and inheritance	0 = no 1 = yes	-	-	73.33% 26.67%
300	Other_	People that are in agriculture thanks to other reason (professional)	0 = no 1 = yes	-	-	56,00% 44,00%

Source: own elaboration

Therefore, recalling the equation 4 and 5 the probit model will be specify as:

$$6) W_{i1} = \alpha_1 + \beta_1 \text{Age} + \beta_2 \text{Edu} + \beta_3 \text{Gen} + \beta_4 \text{KVZ} + \beta_5 \text{Pass} + \beta_6 \text{Trad} + \beta_7 \text{Relation} + \beta_8 \text{Diff}_1 + \beta_9 \text{Diff}_2 + \beta_{10} \text{Diff}_3 + \beta_{11} \text{Distance} + \varepsilon_1$$

$$7) W_{i2} = \alpha_2 + \beta_1 \text{Age} + \beta_2 \text{Gend} + \beta_3 \text{Trad} + \beta_4 \text{Other} + \beta_5 \text{Relation} + \beta_6 \text{Diff}_1 + \beta_7 \text{Diff}_2 + \beta_8 \text{Diff}_3 + \beta_9 \text{Distance} + \varepsilon_2$$

in which it is assumed that stochastic component has normal distribution

$$\varepsilon_n = \{\varepsilon_{n1}, \dots, \varepsilon_{nj}\} \approx N(0, \Omega)$$

3 Results

3.1 Willingness to follow-up and to cooperate

According to table 2 below we can see how, with reference to the main variables taken into consideration in the two models, the descriptive statistics vary among the three groups created based on their choices in the two steps. Starting from the entire sample composed by among 300 young farmers, and following what they declared for

the first step, it has been possible to classify the respondents in two groups, the followers and the unresponsive.

Table 2: Statistical descriptive of three different groups (unresponsive, follower, active follower)

variable	Meaning	coding	Unresponsive		Follower		Active follower	
			Mean	Freq.	Mean	Freq.	Mean	Freq.
WTF	Willing to follow VàZapp' events	-	-	39.00%	-	61.00%	-	-
Form_agr	Fomal and professional agreements	-	-	-	-	84,70%	-	15.30%
Gen	gender	female male	-	13.68% 86.32%	-	19.67% 80.33%	-	25.00% 75.00%
Age	Years old		39.67		37.63	-	40.32	-
Distance	Kilometers far from Foggia city	-	48.10		45.79	-	36.76	-
KVZ	Know VàZapp' before contadinner	0 = no 1 = yes	-	34.55% 65.45%	-	16.29% 83.71%	-	16.67% 83.33%
Pass	People that are in agriculture thanks to passion	0 = no 1 = yes	-	70.09% 29.91%	-	64.48% 35.52%	-	71.43% 28.57%
Trad	People that are in agriculture thanks to tradition and inheritance	0 = no 1 = yes	-	73.50% 26.50%	-	73.22% 26.78%	-	75.00% 25.00%
other	People that are in agriculture thanks to other reason (professional)	0 = no 1 = yes	-	52.99% 47.01%	-	57.92% 42.08%	-	46.43% 53.57%

Source: own elaboration

Followers (61%) are people that declared to be willing to be involved in the follow-up of VàZapp', while the unresponsive (39%) refers to the remaining part of the sample that declared to be not willing to follow further VàZapp' initiative after the contadinner in which they were hosted. The second step enables to classify the followers (183 farmers) into two groups according to having reached a formal or professional agreement in VàZapp', in which is possible recognize as active follower that farmer indicated as partner of a project or a cooperation in VàZapp'.

By observing the values expressed in the table in average or frequency for the variables considered, very significant variations are not observed in the direct comparison among the three groups, but anyway it is possible to linger on some variations that could explain the socio-economic characteristics of the three groups. Age variable remains almost constant into three groups, about 40 years old. It is interesting how the distance of agents from the city of Foggia is reduced by 12 kilometers in the last group (active followers), meaning that farmers active involved in a formal agreement with VàZapp' are closer to Foggia and, consequently, they are closer to each other. Percentage of people that declare to know VàZapp' movement

before the contadinner are higher in the follower group, which includes inside also the active followers. Another important information is given by the questions about the why the farmers interviewed are in agricultural sector with the relative differences of answer among the groups. About this aspect, it is possible observe an increasing in percentage of people that composed the group of active follower, which declared to stay in agriculture not for passion and tradition transmitted by parents or family, but for other motivation and especially for professional reason. This data could be understand as a behavior of the farmers that arrive to stipulate a formal agreement with other farmers, with a view to professional growth or to make income.

3.2 Two-step model estimates

According to the predetermined objective and utilizing the proposed methodology, it would be possible to estimate the probability for each attendance to belong to the group of *followers* and to the group of *active followers*, starting from the socio-economics characteristics of the individuals.

Table 3 reports the probit model results for the first stage in the case of farmer's preferences about the willingness to follow further V&Zapp' activities and news. In addition to the coefficients β estimates by the model, in the table we have also the value of marginal effects, understood as variation of percentage point of each variables considered starting from the probability predicted (0.66) by the model per each respondent to respond yes at the first step. Trying to explain the meaning and the interpretation of β coefficients, we start from the constant value α , which is has a negative value of -1.83, and is interpreted as low probabilities that have each participant to belong to the followers category without to have the possibility to know V&Zapp and to participate to the contadinner. By starting from this value, the socio-economic determinants that influence in positive way in this probability are the female gender ($\beta = +0.45$) and to know already V&Zapp' ($\beta = +0.53$), while the age influence in negative way ($\beta = -0.15$). The perceived utility of contadinner, considered as the satisfaction degree from 1 to 5, turns out to be significant and positive with a β equal to +0.30. About the marginality determinants, the model estimation shows that the distance from Foggia in not significant, while are statistically significant and positive the difficulty 1 (difficulty in creating new sales channel) with a β of +0.18, and the difficulty 3 (difficult to introduce quality products) but with a negative value ($\beta = -0.41$).

Table 3: Probit model Estimates for step 1

Log likelihood = -88.962769			Number of obs = 153		
Marginal effects after probit			LR chi2(11) = 20.74		
Y = Pr (WTF) (predict) =			Prob > chi2 = 0.0361		
.66401268			Pseudo R2 = 0.1044		
WTF	Coef.	Std. Err.	Marg. Eff.	Std. Err.	Stat. Sign.
Age	-.0154243	.0109196	-.0056258	.00398	*
Edu	.0395698	.0979054	.0144324	.0357	
Gen	.4542375	.3120992	.1656755	.11364	*
Distance	-.000732	.0021231	-.000267	.00077	
Diff_1	.1816774	.1367348	.0662638	.04982	*
Diff_2	.1282913	.1252517	.0662638	.04562	
Diff_3	-.4191715	.1518813	-.1528858	.0549	***
Pass	.345102	.235652	.1258702	.08577	*
Trad	-.1111471	.2501195	-.040539	.09121	
Relation	.2983566	.1957762	.1088206	.07147	*
KVZ	.5285506	.2684335	.19278	.09792	**
cons	-1.829556	1.288217			*

Source: own elaboration

Significance at 90%, 95% and 99% respectively with (*), (**) and (***)

Table 4 reports the probit model results for the second stage, by working only on the observation that are classified in in first step as followers. The results of the probit estimation reported in the table 4 have the same structure of the previous table (n. 3), indicating both β coefficients and marginal effects with them interpretation.

Table 4: Probit model Estimates for step 2

Log likelihood = -54.424061			Number of obs = 166		
Marginal effects after probit			LR chi2(11) = 17.21		
Y = Pr (form_agr) (predict) =			Prob > chi2 = 0.0455		
.0988284			Pseudo R2 = 0.1365		
Form_agr	Coef.	Std. Err.	Marg. Eff.	Std. Err.	Stat. Sign.
Age	-.0006659	.0140011	-.0001159	.00243	
Gen	-.0882889	.3340997	-.0153617	.05808	
Distance	-.0016389	.0036851	-.0002852	.00064	
Diff_1	-.4051414	.16642	-.0704918	.02855	**
Diff_2	-.0647071	.1581383	-.0112586	.0276	
Diff_3	.4070809	.1963769	.0708292	.03327	**
Trad	.3081057	.3651141	.0536082	.06329	
Other	.2792711	.3407747	.0485912	.05922	*
Relation	-.6035942	.2381022	-.1050212	.04144	***
cons	1.309466	1.789909			*

Source: own elaboration

Significance at 90%, 95% and 99% respectively with (*), (**) and (***)

The constant α result to be positive with a coefficient equal to +1.30, indicating that the people participating the further VàZapp' events could have positive probabilities to stipulate formal agreements with other members of social innovation. Starting from this value, the probit model shows that there are only three variables, among those considered, that can influence this choice. All socio-economic variables are not statically significant in the influence of this second choice, except for the agents that have declared to stay in agriculture field for motivation different by passion and tradition. In fact, the most of them are in agriculture mainly for professional and income motivations. About the utility component, the variables of relation tested in the model turns out to be significant and with a negative coefficient. The interpretation could be that the agents involved in this second choice, are not looking for new relationship, but they prefer to achieve a formal agreement only with other agents already known. Finally, marginality component, represented by the distance and the three difficulties before explained, seems to influence the final choice of the agents involved in the second step. Except for the distance that turns out to be not significant in this step, we have that farmers that highlighted higher difficulty in creating new sales have less probabilities to close an agreement ($\beta = -0.40$), while the farmers that declared an higher difficult to introduce quality products could have more probabilities to achieve a formal agreement in cooperation or professional deal.

4 Discussion and conclusions

The results prove that the VàZapp' experience promoted the social innovation in agriculture aiming at satisfying farmers' needs and at creating new relationships. By decomposing the social innovation process into two steps, some evidences have emerged which are helpful to grasp the dynamics of the phenomenon.

With regards to the willingness to participate to VàZapp' social activities, the relevant variables playing a significant role are: age, farmers' need to find new markets (difficulty 1), farmers' difficulty to communicate the quality of products (difficulty 3), capacity to form new relationships, and knowledge on the VàZapp' community.

In particular, young people are relatively keener to follow the VàZapp' initiatives. This is consistent with the fact that, compared with more aged people, they are more open-minded, more curious to meeting other people, and endowed with less professional relationships. Another aspects affecting the participation rate relies on the need of farmers to look for new markets opportunities; therefore, they envisage in

VàZapp' a possible marketplace where to find new opportunities and new sale channels (e.g. online shopping, direct sales). This is related also to the need to communicate and valorize the quality of their agricultural products.

Having experienced the creation of new relationships, during the contadinner, will favorite the attendance to further initiatives. In this regards, it can be claimed that VàZapp' has fulfilled the participants' expectations of creating new networks. For this reason, it emerges that the participation to contadinner exerts a "reinforcing" effect on the participation to further events.

With regards to attitude to stipulate a formal agreement within VàZapp' network, the relevant variables playing a significant role are: farmers' need to find new markets (difficulty 1), farmers' difficulty to communicate about quality products (difficulty 3), and capacity to form new relationships. Specifically, follower famers tend to not stipulate a formal agreement for new sale channels probably because there are not buyers in the network, but there are several similar actors, who may be perceived as colleagues or competitors. On the contrary, they are inclined to create collaboration forms to valorise the quality of their products using, for instance, a quality brand able to characterize and identify the territorial identity and the product quality.

Finally, the variable "relationship" affects negatively in this second model stage, maybe for lacking of time necessary to strengthen their trust in the other farmers. It could be more useful to assess the relational structures of VàZapp' for measuring of the increase of capital social generated, using a Social Network Analysis.

In conclusion, it is possible to claim that VàZapp' network has already generated some sort of new social capital, which led to the establishment of formal agreements among farmers. Most of the determinants which have been identified as favouring the social innovation may also similarly playing a significant role in the diffusion of other types of innovation, such as age, and actors' needs and expectations, the possibility to get a "reinforcing" stimulus from own's previous experience.

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