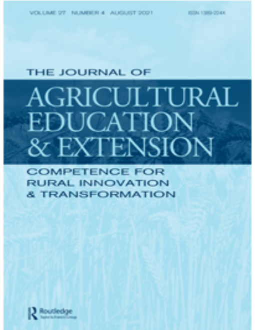
Farmers' networks and the quest for reliable advice: innovating in Greece

Alex Koutsouris, Eleni Zarokosta



Routledge
Taylor & Francis Group

The Journal of Agricultural Education and Extension
Competence for Rural Innovation and Transformation

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/raee20

Farmers' networks and the quest for reliable advice: innovating in Greece

Alex Koutsouris & Eleni Zarokosta

To cite this article: Alex Koutsouris & Eleni Zarokosta (2021): Farmers' networks and the quest for reliable advice: innovating in Greece, The Journal of Agricultural Education and Extension, DOI: 10.1080/1389224X.2021.2012215

To link to this article: https://doi.org/10.1080/1389224X.2021.2012215

Published online: 12 Dec 2021.

THE JOURNAL OF AGRICULTURAL EDUCATION AND EXTENSION
https://doi.org/10.1080/1389224X.2021.2012215

Farmers' networks and the quest for reliable advice: innovating in Greece

Alex Koutsouris and Eleni Zarokosta

Department of Agricultural Economics and Rural Development, Agricultural University of Athens, Athens, Greece

ABSTRACT

Purpose: This paper seeks to better understand the dynamics of farmers' innovating processes by focusing on their sources of advice at various stages of their innovation process, specifically within the weak and fragmented Greek Agricultural Knowledge and Innovation System (AKIS).

Design/methodology/approach: The study employed a mixed-method approach, drawing data from interviews with 112 farmers engaged in three innovation cases in Greece.

Findings: Some farmers, despite the lack of advisory services, are engaged in innovating processes. They thus seek advice from various sources through networks which vary between farmers and stages of the innovating process. However, networking is not always successful and the knowledge acquired is not always valid.

Practical implications: The study points to the need for advisory and innovation support services and facilitated networks in the quest for successful innovating paths.

Theoretical implications: The paper underlines the complexity of farmers' sources of knowledge. Thus, the paper highlights the importance of untangling the innovating processes' stages and farmers' information and advice networks that underpin decision-making in each of these stages.

Originality/value: The paper points to the diversity of configurations of advice pertaining to complex farmers' innovating processes, especially under adverse circumstances in terms of provision of innovation support services.

ARTICLE HISTORY
Received 12 November 2020
Accepted 24 November 2021

KEYWORDS
microAKIS; 'Triggering Change Model'; extension/advisory services; social capital; innovation adoption/diffusion; knowledge transfer/exchange

Introduction

The advisory landscape in Greece for the past three decades has been marked by the absence of a public extension service and the failure of farmer-based organizations. The enrolment of extensionists in a bureaucratic-administrative role in the framework of the Common Agricultural Policy (CAP) has resulted in the provision of fragmented information, largely concerning procedural issues, upon farmers' demand (Alexopoulos, Koutsouris, and Tzouramani 2009). On the other hand, organizational failures and the

CONTACT Alex Koutsouris koutsouris@aua.gr Department of Agricultural Economics and Rural Development, Agricultural University of Athens, Iera Odos 75, 11855 Athens, Greece

'market- and incentive-distorting government interventions' (Iliopoulos and Valentinov 2012, 17) have led many cooperatives to collapse, and those that remain to be devalued by farmers. Farmer-based organizations (FBOs) thus lost the opportunity to satisfy the rising demand for impartial advice as independent advisory services.

The gap in the provision of advice was covered by private agronomists (consultants and, largely input suppliers). Additionally, a number of private, independent advisory companies support producers' groups mainly in the framework of Integrated Production schemes. All these actors and beyond (agricultural research, agricultural education, universities, the Ministry of Rural Development & Food – MRDF, etc.) are poorly connected. Thus, the Greek AKIS, meant to 'inclusively cover[ing] all people and organisations that generate, share, and use knowledge and innovation for agriculture and interrelated fields (value chains, environment, society, consumers, etc.)' (EC 2019, 3), is characterized as weak and fragmented (Koutsouris 2014) and, in general, inspired by a transfer of technology (TOT) culture (Österle et al. 2016; Papaspyrou and Koutsouris 2018). This has occurred at a time when networking, knowledge co-creation and collaboration between different partners in AKIS are becoming of paramount importance as means to stimulate innovation (Koutsouris 2018).

Within this weak and fragmented Greek Agricultural Knowledge and Innovation System (AKIS), we aim to better understand the dynamics of farmers' innovating processes focusing on their sources of advice at various stages of their decision-making process. We apply the concepts of social capital, 'microAKIS' and the 'Triggering Change Model' (TCM) to three empirical case studies: new crop production (avocado), new crop production (stevia) and integrated pest management. While this study draws on the experience of Greece, given the evolution of advisory services towards privatization, pluralism and fragmentation (e.g. Cristóvão, Koutsouris, and Kügler 2012; Klerkx and Proctor 2013; Labarthe and Laurent 2013; Prager et al. 2016; Knierim et al. 2017) and the need for a more nuanced analysis of innovating processes (e.g. Sutherland et al. 2017), these results are expected to be of wider interest.

Conceptual framework

Social capital has been increasingly used in studies related to agriculture, employing quantitative (e.g. regression models, Social Network Analysis – SNA), qualitative or mixed-methods approaches. It has been proven useful in understanding farmers' innovation behaviour, knowledge exchange and learning (see, inter alia, Oreszczyn, Lane, and Carr 2010; Sutherland and Burton 2011; Faysse, Sraïri, and Errahj 2012; Fisher 2013; Tisenkopfs, Kunda, and Šūmane 2014; Tregea and Cooper 2016; Sutherland et al. 2017; Cofré-Bravo, Klerkx, and Engler 2019; King et al. 2019; Madureira et al. 2019; Magala, Mangheni, and Miiro 2019; Kansanga et al. 2020).

Social capital comprises features of social organization – networks, norms and trust – that potentially connect and enable people to act together; it provides access to valuable resources. In the literature, three dimensions of social capital are distinguished (see, inter alia, King et al. 2019). The cognitive and the relational dimensions refer to common norms, values and the closeness of the actors along with their trust and commitment to network, respectively. The structural dimension differentiates among three types of social capital – bonding, bridging and linking, corresponding to 'strong, horizontal social ties, moderate and horizontal or weak and vertical ties respectively' (King et al. 2019, 125). Bonding social capital applies to ties connecting homogenous groups: peers, friends and family members, who participate in trusted relationships, share common values and function in closed networks. Bridging social capital concerns collaborative, heterogeneous networks, such as farmers' networks with advisors and agribusiness. Linking social capital refers to open networks with weak ties, which allow for further spreading of knowledge, including research institutes, governmental services, banks, etc. (Cofré-Bravo, Klerkx, and Engler 2019). These relational ties mediate the mobilization of knowledge resources (King et al. 2019) and influence the potential for innovations to be introduced (Sutherland et al. 2017).

Social capital and change

Strong bonding capital can enable creativity and risk-taking in a network and encourage collaborative learning among persons of equal status (Beers and Geerling-Eiff 2014). On the negative side, strong bonding capital can lead to naval-gazing and myopia, if members become 'overly interconnected'. When this is the case, the so-called 'dark' bonding social capital takes 'the form of lock-in, path-dependency, or entrenchment of incumbent power, all of which can depress opportunities for sharing knowledge or other resources' (King et al. 2019, 125). The lack of bridging and linking social capital hamper innovations as it allows for the creation of 'structural holes' resulting in the isolation of participants from vital resources of knowledge. Therefore, ambidexterity, which refers to the access to both open and closed networks, fosters the implementation of innovations (Cofré-Bravo, Klerkx, and Engler 2019). On the other hand, evidence shows that networks based on bonding or bridging social capital can be successful provided that highly skilled independent advisors take the lead (Cofré-Bravo, Klerkx, and Engler 2019).

According to Hermans, Klerkx, and Roep (2015), the lack of social capital and trust particularly between farmers and government undermines innovative collaborations; opportunities for the sharing of resources that lead to the development of trust among (all kinds of) participants are thus important. Additionally, good levels of formal education increase farmers' confidence, as far as their equal participation is concerned, and their ability to organize themselves and be heard in collaborative networks.

Farmers involved in innovating processes require different sources of support (including knowledge) which they seek through the configuration of relevant networks. According to Sutherland et al. (2017, 430) 'two general forms of knowledge are typically identified: tacit (implicit) and codified (explicit) knowledge … '. The former is 'situated', acquired through practice and experience, the validity of its contents is locally restricted and spreads easily 'within social networks, which enable the collective sharing of ideas and activities for common aims'. The latter is mostly related to science, conceived of as a very powerful 'knowledge system', definitional of knowledge, rationality or objectivity, which can be easily reported and documented but which farmers need to adapt to their specific circumstances to make it useful (see, inter alia, Compagnone, Lamine, and Dupré 2018). The reality of course is that, especially in industrialized countries, 'local farmers' knowledge' is often an amalgamation of different knowledge sources (Sumane et al. 2018). Indeed, the need for interaction and dialogue between different actors and networks in rural development has been long pointed out; especially the recognition that innovating requires local knowledge, expert knowledge and well-functioning social networks (King et al. 2019).

Analysing innovation trajectories: TCM and microAKIS

There is a considerable gap concerning the exploration of the role of social capital throughout (i.e. in different stages comprising) farmers' innovating processes. Despite Rogers' (1983) emphasis on communication (networks), during both adoption and diffusion of innovations processes, the illustrations of social capital found in the literature are rather static.

To unravel innovating processes the TCM of farm decision-making (Sutherland et al. 2012) is utilized. Its basic premise is that for the most part, farms stay on a stable trajectory, making incremental changes (i.e. path dependency). Major changes in farming trajectory occur largely in response to trigger event(s); then farmers recall previously acquired information (to which, at the time, superficial attention was given) or become aware of new interesting information and seek more actively knowledge, assessing and (sometimes) choosing and implementing a new course of action. To do so, they activate their knowledge networks in innovating processes within which three distinctive stages (awareness; assessment and implementation) may be distinguished. New changes are implemented but take time to develop and consolidate, and if unsuccessful, the period of active assessment continues or the farm returns to the status quo. If successful (consolidated/adopted), the changes become the new norm and farmers become path dependent on using the new innovation or approach.

In order to better understand the dynamics of farmers' innovating processes, an analysis of farmers' (so-called) 'microAKIS' is undertaken (see editorial, this issue). The microAKIS comprises the range of individuals and organizations from whom farmers seek services and exchange knowledge and skills (see also Madureira et al., this issue). In this respect, given the (emerging) consensus that social capital influences farmers' decision-making (Fisher 2013), the exploration of the relationships between farmers and advice providers is undertaken through the examination of (mainly the different types of) networks and social capital farmers develop (King et al. 2019). Furthermore, the TCM stages (Sutherland et al. 2012) are utilized to shed further light to farmers' use of (a variety of) advice and knowledge inputs within decision-making processes of adopting (or not) innovations.

Description of the case studies

For this assessment, three innovation cases were selected around Greece (Figure 1). These followed the AgriLink project's[1] overall ambition to address, on the one hand, innovations pertaining sustainability issues as identified in the 'Strategic Approach to EU Agricultural Research & Innovation' (EC 2015) and, on the other hand, well known in each area rather than emerging innovation(s).

The first concerns Integrated Pest Management in Imathia (Northern Greece) and, in particular, the implementation of mating disruption (MD, also known as 'sexual confusion') of insects by installing a network of micro sprayers across peach cultivations.

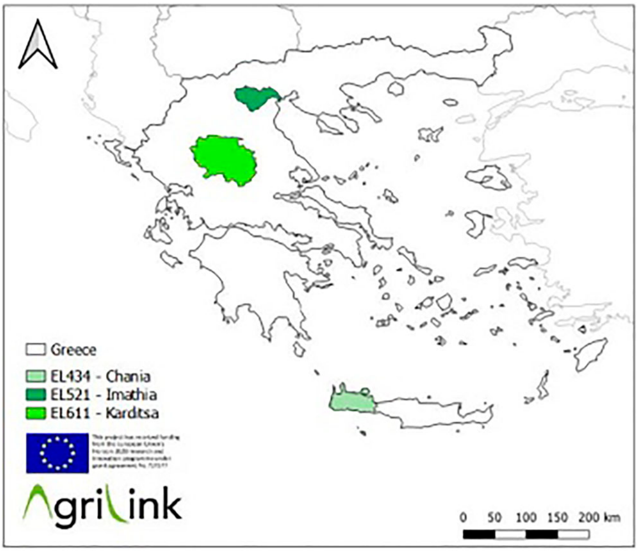


Figure 1. Geographical location of the research sites.

In Imathia, a leading peach producers cooperative (A-coop) had been working since the late 1990s with a private advisory company (A-Co) in introducing Integrated Pest Management to secure environmental-friendly and high quality, certified fruits for the international markets (see: Vlahos, Karanikolas, and Koutsouris 2017). When A-Co learned, through their contacts with research, about MD, they informed A-Coop and decided to test it. This was facilitated through a successful proposal of A-Co for a 3-year pilot. Thus, in 2004, a small number of producers (mainly members of the A-Coop Board, connected with long term, trusting relationships) started implementing MD. Additionally, the two partners started disseminating results to their peers and as a result, in 2008, a consortium of local cooperatives decided to partially subsidize MD through their own producer groups' operational programmes. Moreover, the cooperatives, supported by A-Co, lobbied at MRDF (Ministry of Rural Development & Food) for the inclusion of MD in the agri-environmental measures of the National Rural Development program (NRDP), implying the subsidization of MD. This was achieved in 2014 and resulted in the rapid dissemination of MD among farmers.

The second innovation case concerns the widespread cultivation of avocado in Chania (Crete). In the initial phase (1970s), the local Research Institute of Olive Tree, Subtropical Plants and Viticulture, having established an experimental avocado plantation, was also involved in dissemination activities which resolutely influenced the first adopters. However, due to various hurdles – including the lack of human resources – the Institute gradually stopped playing its leading role. Then, in 1985–1993, a project aiming at the mainstreaming avocado cultivation, through its subsidization, took place in the framework of the Integrated Mediterranean Programmes (IMP). This project, aiming to replace very old and unproductive olive groves, did not bear fruit as only 11% of its original target was reached. Olive and citrus growers were reluctant to abandon these profitable crops for a new one, the demand for which was low at the time. In the most recent phase (2008 onwards), the situation changed due to collapsing prices in the traditional crops' markets and the increasing global demand for avocado, which triggered the rapid expansion of avocado cultivation in the study area (see also: Ragkos, Papoutsi, and Bardouniotui 2019).

The third case concerns the introduction of stevia in the area of Karditsa (Central Greece), owing to the dissemination of the results of research (Tobacco Research Centre and University of Thessaly) on alternative cultivations aiming at replacing high input and water consuming traditional crops such as tobacco and cotton with more profitable and environmental-friendly ones. In 2012, a group of farmers following a seminar in Karditsa, in which two researchers provided information on stevia's cultivation practices, processing and market prospects, established a cooperative for the cultivation, processing and trading of stevia (ASYST). During the next cultivation period, the cooperative ran pilot fields, under the guidance of the University of Thessaly researcher; in parallel, seminars were held in the university. The farmers disseminated the knowledge they gained to their colleagues through discussions and visits to the pilot farms. Input suppliers, although asked, could not provide reliable advice since they had no knowledge of stevia. During the following cultivation period, ASYST farmers imported seeds and started establishing their stevia plantations (see: Koutsouris and Zarokosta 2019).

Methods

In each case study, mixed-method research was carried out including, among others, farmers' surveys and in-depth interviews. The selection of farmers in each case study aimed to target groups of farmers with similar production systems amongst whom the innovation was already widespread. This made possible the identification of the micro-AKIS of both adopters and (informed) non-adopters.

The specificity of the target population, along with the absence of statistical data on adopters (users) and non-adopters (informed about but non-users) of the innovation, led the researchers to adopt a snowball-type sampling procedure. This relied on the support of key-informants familiar with the target group of farmers (e.g. farmer associations/cooperatives, local authorities and other important/knowledgeable local actors). To avoid selection bias, different sources for farmer contacts were used and cross-checked. Despite the fact that the interviewed farmers were not selected randomly, we found no difference in farm size and demographic variables (e.g. age and education) between adopters and non-adopters in the samples.

Farmers' surveys were carried out (April to December 2018) through face-to-face interviews based on a question-guide comprising both open-ended and closed-ended questions intended to gather quantitative and qualitative data. Collected data, developed with support from the preceding literature review, concern: trigger events; farmers' innovation evaluation; knowledge and information sources, flows and social networks; farmer profile and demographics; business model and farm structure. Here, the data describing farmer microAKIS for the three main stages of the TCM (awareness, active assessment and implementation of the innovation) are utilized. In this regard, farmers were asked to identify influential actors (as suppliers of information, knowledge and skills) and the nature ('how' the interaction is done and farmers' activities to assemble knowledge

Table 1. Farmers interviewed per case study.

Innovation case study	Adopters	Non-adopters	Droppers	Total
IPM–MD	25	17	0	42
Avocado	27	9	1	37
Stevia	11	19	3	33

Source: AgriLink – Primary data, 2018

and skills), frequency and direction of the interaction. Additionally, extensive notes of the discussions during the interviews were kept by the interviewers.

These data made it possible to identify the networks (also illustrated in relevant figures cum sociograms, see below) farmers assemble to access information, knowledge and skills in various stages of their innovating journey in each case (i.e. under varying local contexts albeit within in weak and fragmented national AKIS framework). Additionally, data pertaining to some features of farmers' social capital, such as numbers, frequency (or density) and 'nature' of farmers' links and trust, were used to enable a nuanced rapid analysis of the cases. The sampling strategy adopted (i.e. a non-probabilistic sample), although hindering (statistical) generalizations, allowed for exploring and explaining the dynamics of farmers' innovating processes under certain circumstances.

A total number of 112 farmers (Table 1) were interviewed. Moreover, three farmers per case (an adopter, a non-adopter and/or a dropper – i.e. an adopter who later on dropped/ discontinued the innovation, where appropriate) were selected to provide an in-depth account (narrative) of their substantial but differentiated involvement with the innovation under study; thus, a rich picture of farmers' innovating processes was produced.

Results – actors and networks in innovating processes

The MD case - Imathia

In Imathia, independent advisors and (related) local cooperatives campaigned for MD (see Table 2 and Figure 2). Thus, farmers became gradually aware of MD through events jointly organized by the cooperatives and the advisors or personal interactions with either of them (overall 69% of the links) as well as through personal contacts with peers (15%). The majority of the farmers (52.3%) had two links (average 1.9 links/farmer for both adopters and non-adopters). Contacts with the two main types of actors account for 59% of the links for non-adopters vs. 75% for adopters; non-adopters had more links with neighbours (25%) when compared with adopters (8.3%). Adopters had more frequent links with the advisors vs. non-adopters, while non-adopters had more frequent links with peers vs. adopters (see Appendix, Table A1). A feature of Figure 2 is the distinctive relationship between non-adopters and peers/neighbours.

The same holds true with regard to the assessment stage (non-adopters: 2.3 links/ farmer vs. adopters: 1.7; see Figure 3) (Table 2). Contacts with the two main actors account for 50% of the links for non-adopters vs. 88.4% for adopters (average 71.4%) with non-adopters having more links with neighbours and friends (38.2%) when compared with adopters (4.7%); the frequency of contacts with peers is slightly higher

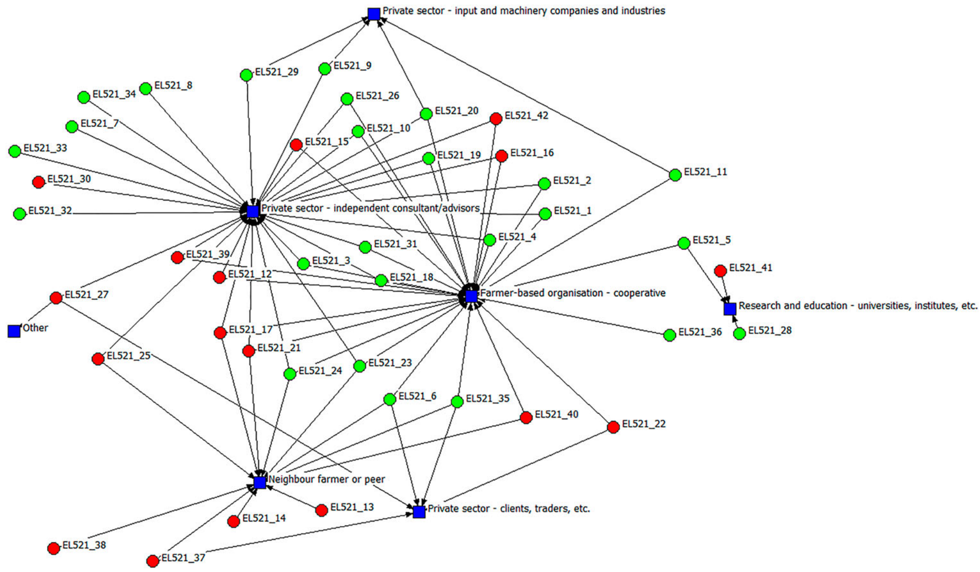


Figure 2. Actors and contacts during awareness – MD. Source: Primary data, 2018. Note: green, adopters; red, non-adopters; blue, advice providers (EL = Hellas/Greece, numbers are the codes of interviewees/questionnaires in the AgriLink data base).

than that with other actors (particularly the cooperative; Appendix, Table A2). Two farmers after being informed abandoned the idea.

For the early adopter 521_34, his participation in the pilots was an immediate decision, owing to his keen interest for free-from agrochemicals yields, his trust and friendship with the leaders of the advisory company and the cooperative, and a vague expectation for a better product price (which did not occur) (Figure 3). However, for some adopters, awareness and assessment activities were interwoven with each other in a long, iterative process. For example, farmer 521_35 who was favourable towards organic farming, heard about MD in 2010 but he soon realized that it was prohibitively expensive. The following year, he saw his neighbour hanging MD sprayers in his orchard and was informed that A-Coop supported adoption. Although interested (and continuously informed), it was only in 2017, when an input supplier informed him that MD was subsidized, that the farmer made an implementation plan.

Nevertheless, assessment might not lead to adoption. For farmer 521_25, an agronomist himself, the assessment included extensive discussions with a well-respected advisor and peer agronomists – input sellers. His conclusion was that MD did not work effectively under the existing conditions (see below) stressing that MD is also 'an intervention in the natural order' with producers entrapped in a vicious circle, where seemingly 'evident solutions' create new problems.

The role of private advisors and cooperatives continued being crucial for the implementation of MD (Figure 4) since together they organized trainings and discussions providing farmers with detailed know-how and evidence of its effectiveness. Three out of four of farmers' links concern these two types of actors. Again, the majority (56%) of the 25 farmers who implemented MD had two links (average 1.8 links/farmer).

Table 2. Actors per stage (adopters and non-adopters) – sexual confusion (MD).

Stage		FBO*	Independent consultant	Input companies	Clients, traders	Business partners	R&E	Neighbours	Family and friends	Others
Awareness	Non-adopters	9	10		3		1	8		1
	Adopters	17	19	4	2		2	4		
	Total	26	29	4	5		3	12		1
Assessment	Non-adopters	10	7	1	2			12	1	1
	Adopters	17	21	1	1	1		2		
	Total	27	28	2	3	1		14	1	1
Implementation	Adopters	15	19	3	2			5		1

*FBO, farmer-led/based organizations (cooperative, association, etc.)

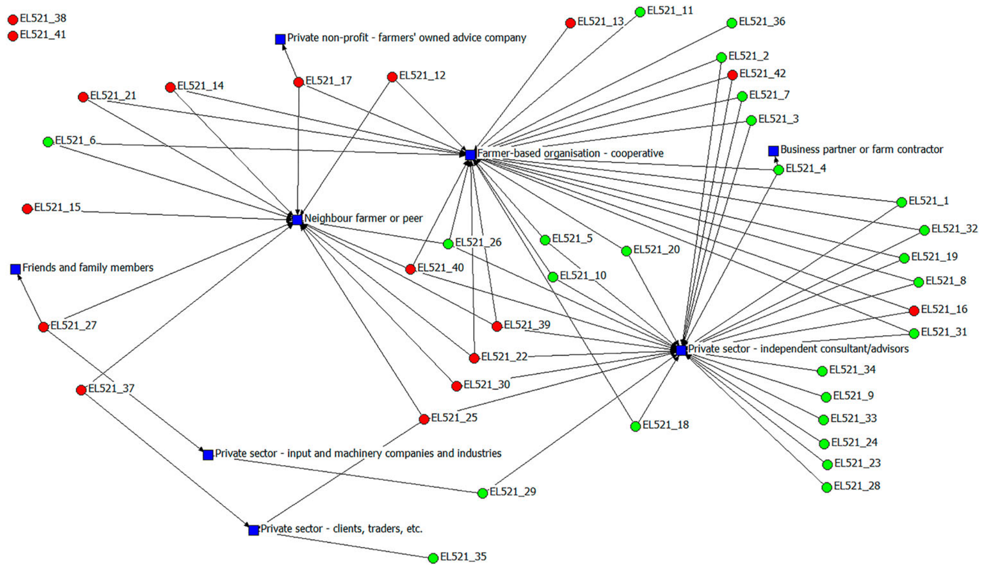


Figure 3. Actors and contacts during assessment – MD. Source: Primary data, 2018.

It is interesting to see that some farmers relied only on (private) actors other than the two main ones (A-Co and A-Coop), an indication of the influence exerted by the latter ones on their own peers. Fifteen farmers did not proceed to the implementation stage. Again, the frequency of contacts for those of the farmers who have contacts with peers is higher than with other actors (Appendix, Table A3). In general, the producers did not mention particular problems related to the flow of knowledge during the implementation of MD.

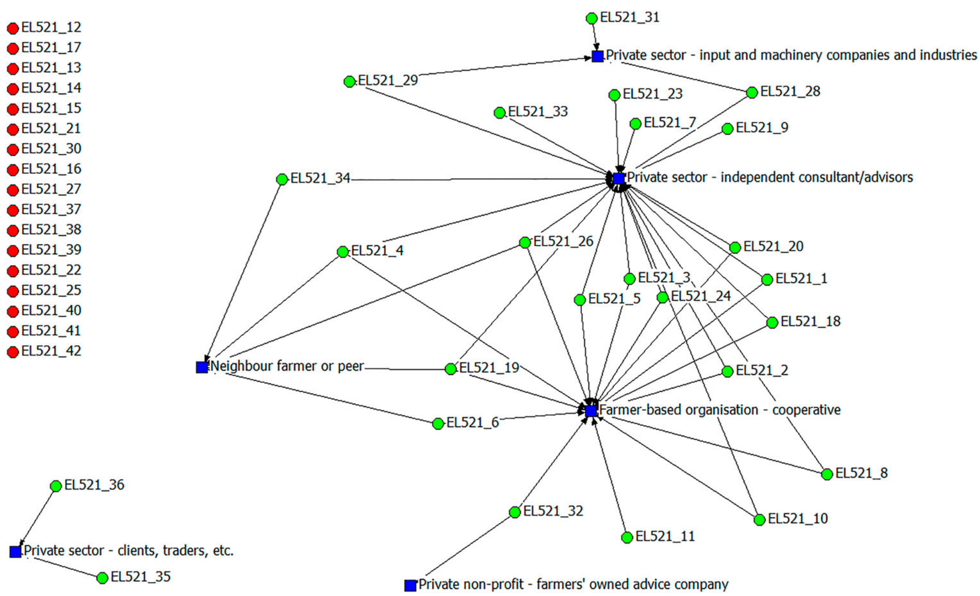


Figure 4. Actors and contacts during implementation – MD. Source: Primary data, 2018.

According to farmers, their hesitation to adopt MD derived from a lack of trust concerning: (a) the intention of neighbouring farmers to adopt and thus help in the large-scale implementation and thus effectiveness of MD; (b) the decreasing of implementation costs (also related to the small and fragmented farms); (c) the ability of the payment organizations to reimburse the cost in time (which is crucial for the financial viability of small-medium farm-holdings) and (d) the willingness of the agrochemical industry and the surrounding web of interests to produce ecologically viable solutions in the interest of producers as well.

The avocado case - Chania

In Chania (Table 3 and Figure 5), farmers' social circles (peers, friends and family) had a leading role in awareness (on average 48.2% of the links, 76.9% for non-adopters, largely most frequent/dense ones vs. other actors; see Appendix, Table A4) followed by the local Research Institute (19.6%, albeit with the weakest communication/links), the local Directorate of Agriculture – DoA (12.5%, with adopters having all but one link which are frequent, suggesting links with neighbours) and private sector actors (only adopters – frequent links). It has to be noted that DoA is represented by a well-known agronomist who is an avocado grower and works with avocado cultivators beyond his official duties. It is also interesting to note that 23 out of the 37 farmers (62.2%) had only one link with someone else and 11 others (29.7%) had 2 links (average: 1.5 links/farmer). In addition, adopters are in contact with double the types of actors vs. non-adopters.

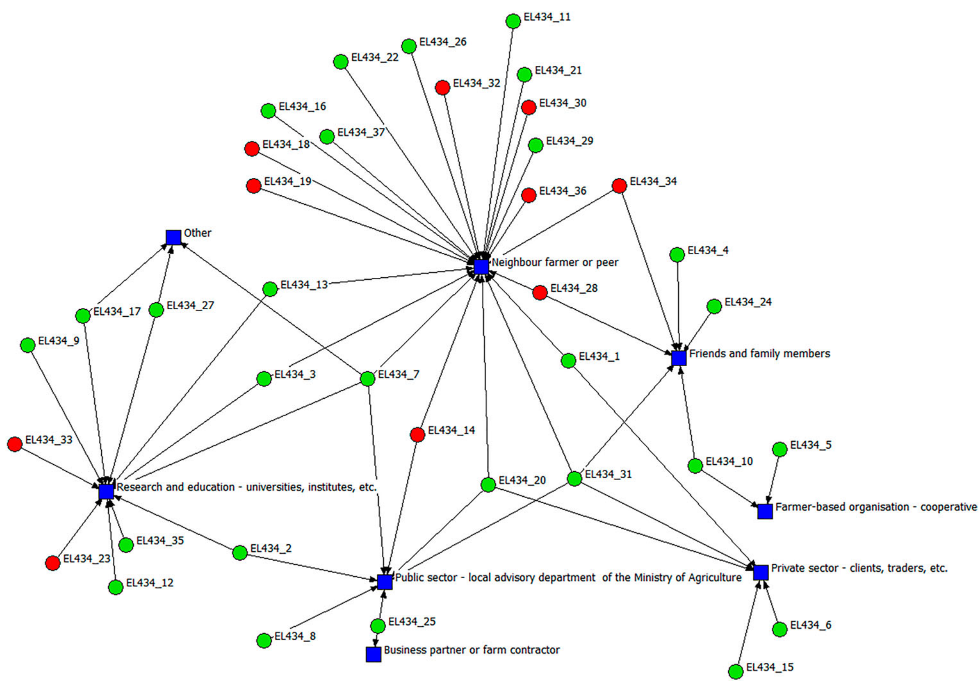


Figure 5. Actors and contacts during awareness – avocado. Source: Primary data, 2018. Note: green, adopters; red, non-adopters or droppers.

For some farmers, the financial incentive was important. In 1985, when the state financially incentivized farmers to adopt the crop through IMP, farmer 434_23 seized the opportunity; he had heard about avocado cultivation during a seminar organized by the Institute in the early 1980s, and he had already several discussions with other farmers, including first adopters (Table 3).

During the assessment stage (Figure 6), farmers more frequently turned to experts (the Institute and the DoA accounting for 22.2% and 15.9% of all farmers' links, respectively). Links with the DoA are as strong as the ones with peers – the same is not true for research and private actors (overall average 20.6 vs. 10.7% in awareness; quite strong links) since farmers sought evidence to support their decision (and investment). Non-adopters mainly turned to the DoA ('peer' – agronomist) while adopters turned to private actors (from whom they would buy their saplings). Peer-to-peer and family/friends contacts were less common at this stage (38.1%; 53.8% for non-adopters) but still the densest ones (see Appendix, Table A5). The farmers who proceeded to assessment were more active in the sense that they establish more links (2/3 have 2 or more links; average: 1.8 links/farmer; adopters 1.9 vs. non-adopters 1.6; adopters continue to be in contact with double the types of actors when compared with non-adopters). It is also noted that three adopters did not receive any assistance at this stage. Two of the adopters (434_13 and 434_17) inherited an avocado plantation (from very first adopters); the third one (434_35), who first tried in 1974 failed and tried again in 1983, claims that he learned through his experience (learning-by-doing) while 'agronomists learn from us/cultivators'. Two other farmers abandoned the idea after learning about it.

It has to be mentioned that among the first avocado growers were agronomists (e.g. actor 434_03) who saw in avocado cultivation an opportunity for making an income and a professional challenge; most of them have been actively involved in supporting (other) farmers.

The advisory landscape became more complex for the farmers who implemented the innovation (Figure 7). In the implementation stage, farmers sought support from peers (presenting again the densest links albeit dropping to 31.3%) followed by private sector actors (25.4% of farmers' links, mostly nursery owners – agronomists themselves or employing agronomists, with dense links resembling those with peers), the Institute (17.9% but with the weakest links, see Appendix, Table A6), the DoA (13.4% with links as strong as the ones with peers), and the local cooperative (11.9%; strong links). Seven farmers did not proceed to the implementation stage. In this stage, farmers establish even more links (96% of those who proceeded to this stage have at least two links; average: 2.4 links/farmer) since they dealt with knowledge gaps and the need to cross-check information. Again, two adopters claim that they implemented based on their own experience while a dropper can be noted (434_23) in the figure.

Soon after establishing their plantations, some of the very first adopters found themselves dealing with severe problems. The flow of information from the Institute diminished; some farmers abandoned the cultivation. This was the case of farmer 434_23 who saw his trees drying up soon after planting. Many of his colleagues who took subsidies through IMP also failed because neither the competent authorities nor input suppliers were knowledgeable enough or interested in acting as sources of reliable advice (434_24). Nevertheless, interviewees also admit that some farmers failed because they ignored the provided advice; replanting trees four times within a decade was not rare.

Table 3. Actors per stage (adopters and non-adopters) – avocado.

Stage		FBO	Independent consultant	Input companies	Clients, traders	Business partners	R&E	DoA	Neighbours	Family and friends	Others
Awareness	Non-adopters						2	1	8	2	
	Adopters	2			5	1	9	6	13	4	3
	Total	2			5	1	11	7	21	6	3
Assessment	Non-adopters				1		2	3	7		
	Adopters	2	1	2	8	1	12	7	16	1	
	Total	2	1	2	9	1	14	10	23	1	
Implementation	Adopters	8	1	4	11		12	9	20		2

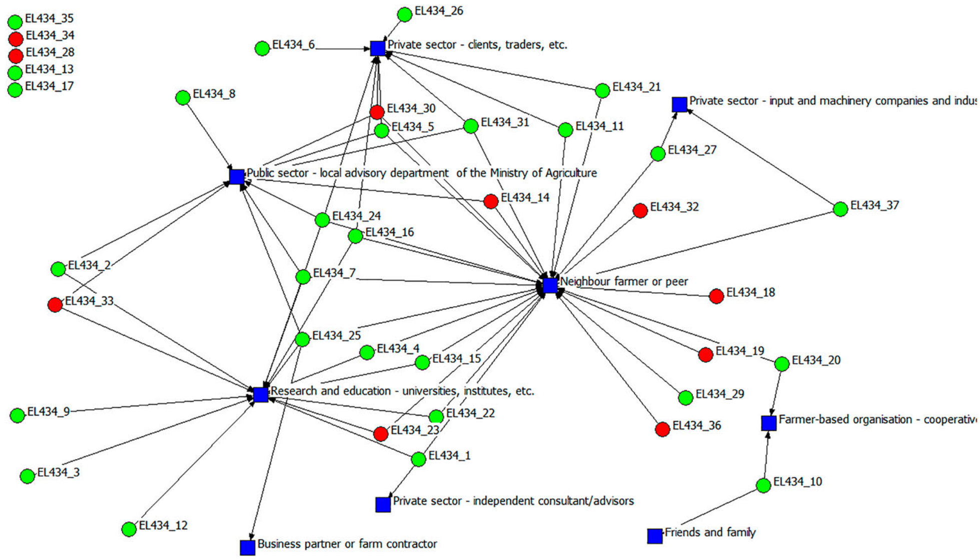


Figure 6. Actors and contacts during assessment – avocado. Source: Primary data, 2018.

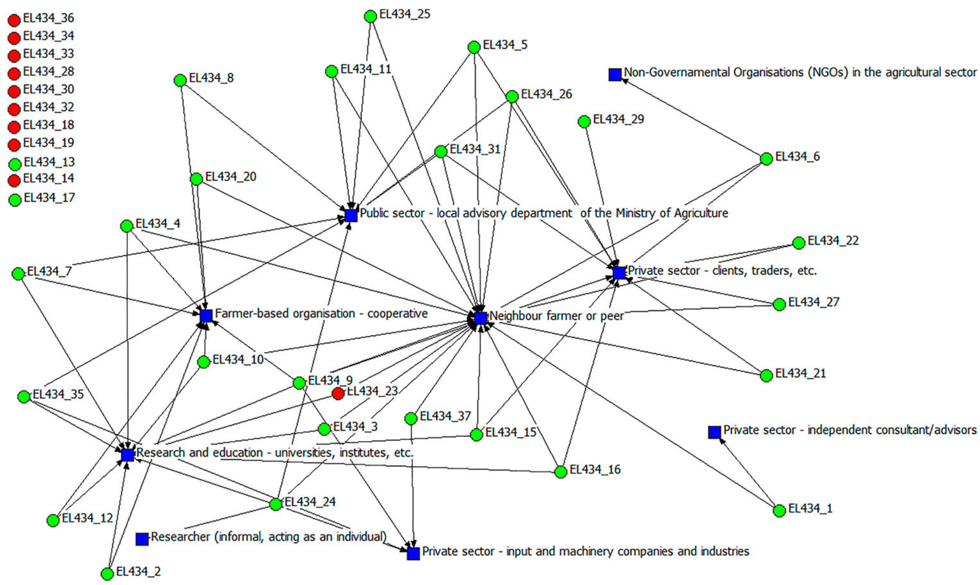


Figure 7. Actors and contacts during implementation – avocado. Source: Primary data, 2018.

In the farmers' view (e.g. 434_23 and 434_24) even experienced avocado producers continue learning, while the whole process of knowledge sharing relied on —two to three agronomists who drew much of their knowledge from their experiences as avocado producers. As farmer 434_24 put it: 'I trust only the opinion of agronomists who are avocado growers as well'. However, not all farmers blamed the individuals; the regulatory and administrative framework, particularly the educational system, was also blamed (435_27).

Furthermore, a number of farmers (e.g. farmers 434_15, 434_25) given their need for knowledge on both production and marketing became favourable towards the idea of a cooperative that might support them to become and remain competitive. The idea of a local, trading avocado cooperative was attempted previously by early adopters but unsuccessfully. As aforementioned, Greek farmers largely do not trust cooperatives (Iliopoulos and Valentinov 2012) due to either limited capacity for concerted action among their colleagues (434_15) or 'villainy on the part of those managing the idea of cooperatives' (434_12). Nevertheless this changed with the Organic Farmers' Cooperative (established in 2007) that plays a significant role in advising its members, avocado growers and to some extent other interested farmers.

The stevia case - Karditsa

In Karditsa (see Table 4), awareness activities (see Figure 8) were initiated by researchers (40% of the links albeit very weak ones, re: seminar attendance; see Appendix) and then largely undertaken by interested farmers (peers: 31.4%; the densest links) and their (stevia) cooperative (ASYST) (11.4%; not frequent links on average) on the basis of face-to-face and group discussions. Despite the fact that the number of links do not differ between adopters and non-adopters (average 2.1 links/farmer), the frequency of links with ASYST is definitely higher among adopters (Appendix, Table A7). Moreover, adopters have more links with research (44.4% vs. 37.2%) while non-adopters have more links with neighbours (34.9% vs. 25.9%).

Earlier, some of these farmers had already been seeking alternatives in order to continue farming and sustain their income. This quest drove farmer 611_15 to attend a seminar about stevia in 2004 and to run a pilot on his own. When he heard again about stevia in 2012, he immediately became an active member of ASYST and disseminated the idea to other farmers (Table 4).

In the assessment stage, farmers were again in contact with peers (26.9% of the links, the densest ones) and the cooperative (23.1%), with research continuing to play an important role (33.3% – re: initial and subsequent seminars and first-year trials' guidance) (Figure 8). Social circles also played a role. At this stage, farmers' links slightly intensify; the majority (51%) have three or more links (average 2.4 links per farmer) with adopters having more links when compared with non-adopters (2.8 vs. 2.1). Furthermore, adopters have more links with research and they also have more dense links with ASYST (Appendix, Table A8). There were no dropouts at this stage (Figure 9).

Table 4. Actors per stage (adopters and non-adopters) – stevia.

Stage		FBO	Clients, traders	R & E	Ex-researcher	Neighbours	Family and friends	Others
Awareness	Non-adopters	5	2	10	6	15	2	3
	Adopters	3	2	8	4	7	2	1
	Total	8	4	18	10	22	4	4
Assessment	Non-adopters	10	4	8	6	12	3	2
	Adopters	8		10	2	9	4	
	Total	18	4	18	8	21	7	2
Implementation	Adopters	9		5	3	11	1	

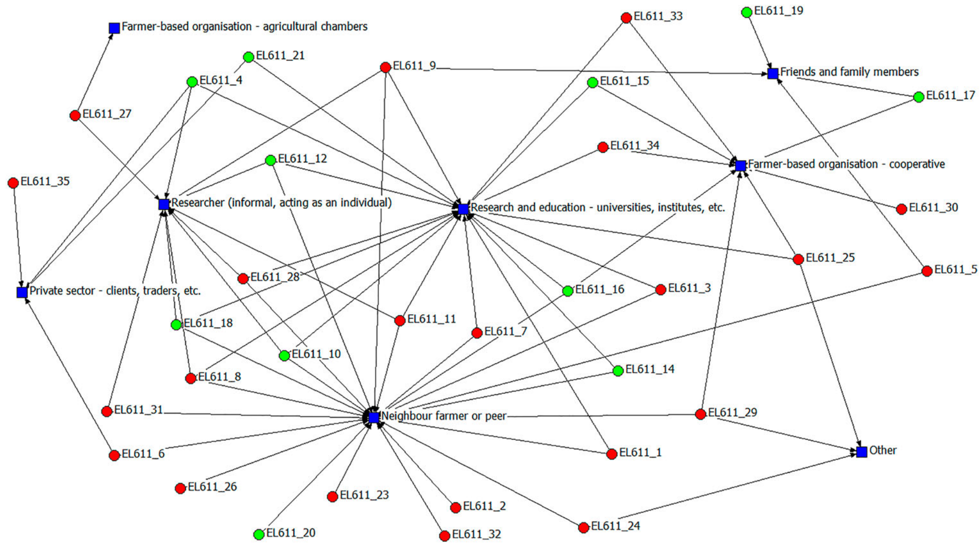


Figure 8. Actors and contacts during awareness – stevia. Source: Primary data, 2018.

ASYST farmers collaborated closely with each other (ASYST and neighbours: 69% of the links – very dense ones; Appendix, Table A9) so as to cultivate stevia successfully (implementation; Figure 10); organizing group discussions, paying farm visits and exchanging valuable knowledge. The links (1.9 links/ farmer) and the actors are less prevalent at this stage. The contribution of research was diminished as compared to

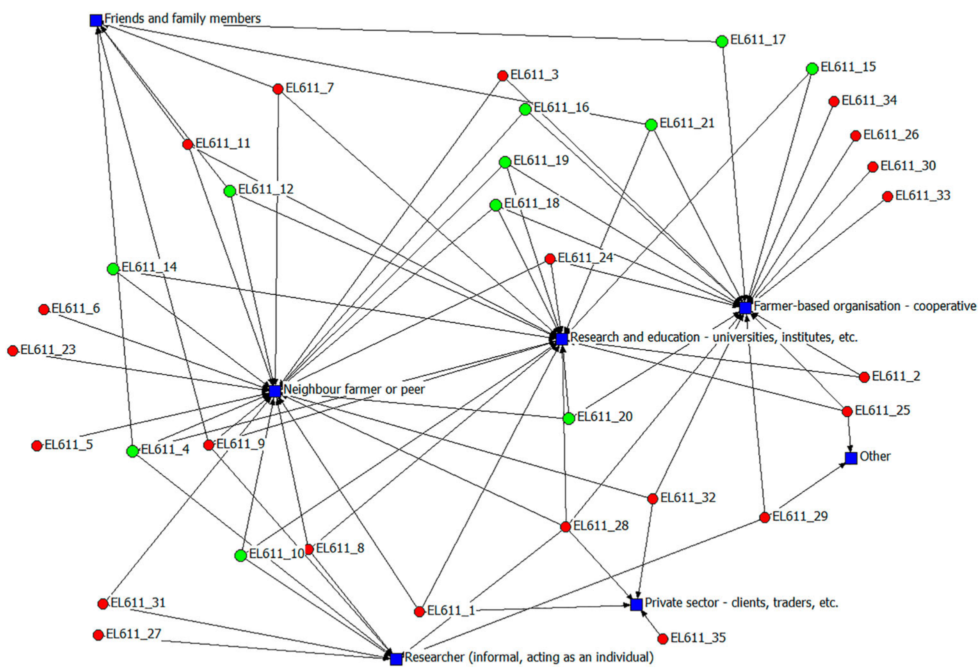


Figure 9. Actors and contacts during assessment – stevia. Source: Primary data, 2018.

the previous phases (27.6% of the links; rather infrequent links). Nineteen farmers did not proceed to the implementation stage; 611_24 is a dropper.

The main challenges the farmers had to overcome were related to the supply and the treatment of seeds and planting material as well as to the drying process requiring special and very expensive facilities (Figure 10). Other worries concerned the lack of know-how and support on cultivation issues, uncertainty as the innovation was at an experimental stage and financial restrictions given the high investment cost of the processing unit (see: Koutsouris and Zarokosta 2019).

Discussion

The results of this investigation, focusing on farmers' interactions throughout their innovating trajectories (leading to innovation adoption or not), can be further explored through the lens of social capital (see Table 5 which summarizes the numbers of actors shown in previous tables into three social capital types as aforementioned in the conceptual framework; see, inter alia, Cofré-Bravo, Klerkx, and Engler 2019; King et al. 2019). In this exploration, 'innovating' is understood as a dynamic process emerging from actors' networking and socializing: from exchange, negotiation, collaboration and (social) learning within a physical and social context (on the relational approach to knowledge and innovation see also Oreszczyn, Lane, and Carr 2010).

In Imathia, the close cooperation of two leading players (cooperative and advisory company) created the preconditions necessary for the TOT (knowledge exploitation) albeit in a 'conventional' top-down fashion. On the one hand, they created the enabling

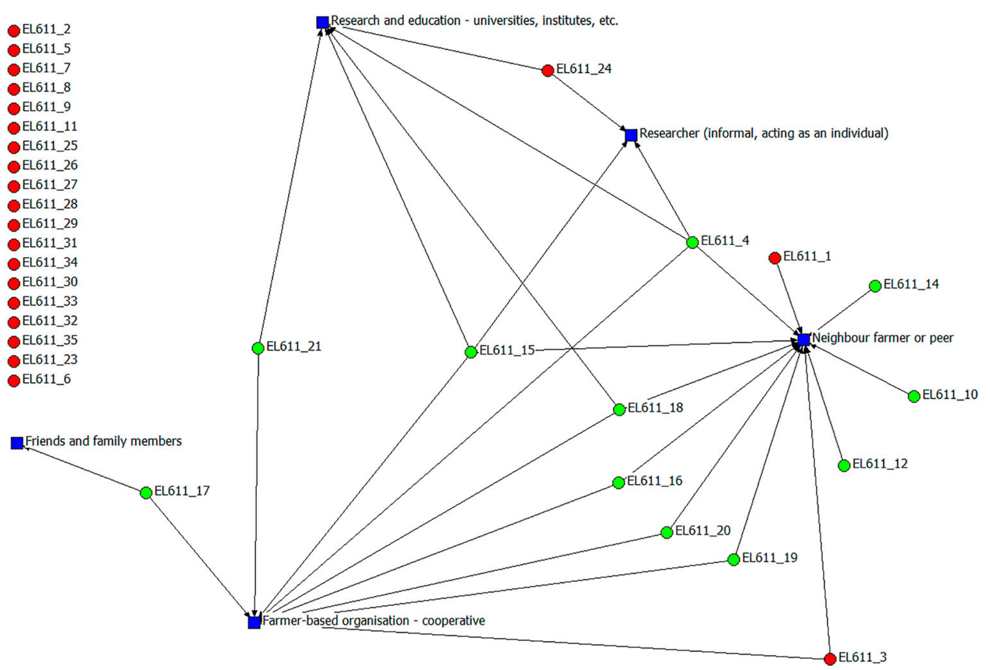


Figure 10. Actors and contacts during implementation – stevia. Source: Primary data, 2018.

Table 5. Types of social capital mobilized in different stages of innovations (per case).

	Innovation	Bonding (coops, peers, friends, family)	Bridging (advisors, agribusiness)	Linking (research, govt, etc.)	No. of farmers
Awareness	MD	38	38	3	42
	Avocado	29	13	11	37
	Stevia	34	4	28	33
Assessment	MD	42	35	0	40
	Avocado	26	23	13	32
	Stevia	48	4	26	33
Implementation	MD	20	25	0	25
	Avocado	28	25	13	26
	Stevia	21	0	8	14

Source: Primary data, 2018.

environment (schemes for MD subsidization) and, on the other hand, they actively promoted the innovation; thus their importance increased as the process evolved. Though farmers did not develop linking social capital, the configuration of the network was successful due to the mobilization of independent advisors (who had links with research). At the same time, the leading organizations (A-coop and A-Co) sought to engage as many of their peer organizations as possible in their initiative, encouraging the development of bonding social capital at their levels. Non-adopters established more links in the assessment stage in their effort to learn more about the innovation. Such links were more neighbour-oriented than those of the adopters who had more frequent contacts with the two main actors in the awareness stage (and beyond) and thus were better informed about MD from the beginning. The main issues referred to by farmers were trust towards peers (i.e. that they would also implement MD), the state (re: timely reimbursement of expenses), the vicious circle of farmers exploitation (no matter the form of exploitation) and the disturbance of nature (even with IPM and MD).

In Chania, the landscape is more complex (similar to a 'network of practice'; Oreszczyn, Lane, and Carr 2010). Due to the lack of continuous support by any specific actor, farmers were informed and turned to multiple actors for support (research, agronomists, nurseries, neighbours, etc.) In the initial phase (1970s), the local Institute's dissemination activities resulted in the development of some linking capital. Nevertheless, in the latter phase (2008 onwards), much more important were the links with a few agronomists (including the one working in DoA) whom farmers trusted due to being avocado growers as well. These agronomists along with private actors (mainly agronomists in the nurseries where farmers bought saplings) comprise farmers' bridging capital. It has to be underlined that adopters had more diversified links (either they had already wider networks or were more active information/advice seekers) while the majority of non-adopters' links concerned peers, friends and family. Nevertheless, peer-to-peer interactions did not always result in concrete or adapted knowledge which may owe to a number of factors such as information distortion; failure (especially in everyday encounters) to translate either general, scientific or experiential knowledge and 'know-how' so as to cater for each farmer's needs and circumstances; the lack of 'events-opportunities' to exchange knowledge in a coordinated and facilitated way; and the lack of occupational and agricultural education or training. In this respect, despite access to a network, farmers did not acquire the necessary knowledge. This in turn often led growers to repeated failures (Ragkos, Papoutsi, and Bardouniotui 2019). The fact that the number of links intensified when moving from awareness to implementation along with the emergence of the Organic Farmers' Cooperative as an important actor at the implementation stage signifies farmers' need for independent and reliable advice. Finally, various issues of trust emerged, related to public authorities at various levels (local DoA, national regulatory framework), non-cultivator agronomists and the umbrella Cooperative of Chania.

In Karditsa, farmers gradually created a rather closed network characterized by strong ties among peers. Research (University and retired researcher) played a strong role in awareness but their role diminished especially in implementation. This owes to the informal relationship between the parties and to the diverging approaches of different researchers which undermined farmers' trust towards them. Therefore, farmers with strong, bonding ties engaged in collaborative learning to accomplish their goals within their cooperative (like a 'community of practice'; Oreszczyn, Lane, and Carr 2010). Nevertheless, the lack of advisory support (re: bridging) and the gradually weakening role of research (re: linking) left 'structural holes' and led to farmers' isolation.

The three cases thus differ according to Sutherland et al.'s (2017) typology of networks: the MD case resembles the 'centralized' type (central node, i.e. alliance of A-coop and A-Co, dominating innovatory knowledge flows), with stevia resembling the 'distributed' type (i.e. dense farmers' network/cooperative exchanging mainly tacit knowledge) and avocado following the 'decentralized' type (i.e. network connecting diverse individuals). Of course, according to Sutherland et al. (2017), these are ideal types and in practice, as in our cases, their distinctions are blurred. Furthermore, different types of networks relate to different types of knowledge. In the case of MD, codified scientific knowledge was translated into know-how and transferred to farmers. In the case of avocado cultivation, some codified knowledge was initially available through the Institute, but it was not adequate for successful implementation under diverse agro-environmental conditions. Since 2008, hybrid actors (agronomists – avocado cultivators) have become the most respected sources of knowledge; however, due to the lack of research and data, they are not able to cover diverse farmers' needs, especially through the few 'formal' events (lectures) taking place. Farmers thus exchange their 'amalgamated' knowledge (knowledge from various sources and their own informal trials) with peers during their everyday encounters (see also Sumane et al. 2018). The lack of opportunities for the improvement of farmers' capacities (e.g. observation and interpretation of the specific conditions under which they cultivate and take decisions) is considered important since Greek farmers are among the least trained in Europe (EUROSTAT 2019), possibly implying farmers' limited ability to critically select and/or interpret knowledge (see Hansen and Greve 2015). Therefore, the generalization of knowledge, i.e. the 'unsticking' of individual or group knowledge from concrete experience, so that it can circulate more widely is not attained (Compagnone, Lamine, and Dupré 2018). Access to a network does not inevitably imply access to the knowledge it contains (Nieves and Osorio 2013). On the other hand, stevia farmers, after initial guidance by research (about seminars and first on-farm trials), organized their own experimentation and social learning through their network/cooperative (see Sumane et al. 2018). ASYST managed to build an internal environment conducive to collaborative learning but its links with external actors were weakened depriving them of access to other potentially useful knowledge resources.

Therefore, in the latter two cases (avocado and stevia), adopters resemble Klerkx et al.'s (2017) 'do-it-yourselfers'. In both cases, the lack of advisory support is more than obvious leading farmers to get engaged in innovating processes in their own way; including their own experimentation and/or seeking/networking with multiple sources of information. However, the existence of a leading actor driving the innovating process in stevia case (ASYST) makes a noticeable difference between these cases.

In all cases, farmers resorted, more or less, to their bonding capital (strong ties with peers, neighbours, family members as well as cooperatives in MD and stevia – in stevia 'neighbours' and 'cooperative' were largely used interchangeably by farmers, especially at the implementation stage). While this is not surprising (see, inter alia, Wood et al. 2014), our research shows that farmers who are 'exclusively' dependent on peers, neighbours and family for knowledge and experience exchanges largely belong to the non-adopters category. This certainly points to the negative effects of 'dark' (bonding) capital; in this respect, skillful facilitation is required for ambidexterity and overcoming network failures (see King et al. 2019; Cofré-Bravo, Klerkx, and Engler 2019).

Important, at least in avocado, are the actors with higher versatility in roles (Cofré-Bravo, Klerkx, and Engler 2019) which, in turn, makes their classification in terms of social capital (see Table 5) difficult. Indeed, if the DoA agronomist is classified as a peer (which explains the dense links with farmers according to the homophily principle; Rogers 1983), as in the avocado case, then the DoA disappears as a player and the role of bridging capital falls by almost half. Despite such considerations, such 'hybrid actors', i.e. individuals with both codified and tacit knowledge (Klerkx and Proctor 2013; Sutherland et al. 2017), are extremely important as knowledge brokers whom farmers are familiar with and trust.

Trust, as reflected in all the networking literature (see, inter alia, Hermans, Klerkx, and Roep 2015; King et al. 2019), emerged as fundamental in all cases; issues with trust were identified concerning all levels (from local to international) but differentiated per case. Moreover, it is noticeable that some actors are totally missing from the scene (e.g. Dir. of Agriculture/ex-Extension Service). Despite the country's weak and fragmented AKIS, one would expect that certain actors are present. Trust issues and the presence or absence of certain actors reflect, of course, the specific contexts amidst which farmers are called to practice farming. This, in turn, restricts choices in terms of problem framing, identification of innovation issues and evaluation of solutions (Sumane et al. 2018; Ingram et al. 2020). Further to the social structures and processes that give rise to the phenomena and cases under study, the differentiated 'nature/characteristics' of the innovation(s) and knowledge studied must be underlined (see Nieves and Osorio 2013; Sutherland et al. 2017).

Finally, while in the case of MD, the role of financial support has been crucial, the same is not true for the avocado case in which it rather played the role of a facilitator of farmers' '(somewhat) safe' experimentation; indeed, it was the market that drove most farmers to turn to avocado. Additionally, financial incentives are not the sole trigger leading farmers to change: household/farm viability, personal values (re: sustainability) and (professional) challenges may well trigger innovating journeys (see Nieves and Osorio 2013; Cofré-Bravo, Klerkx, and Engler 2019).

Conclusion

The aim of this research was to better understand the dynamics of farmers' innovation processes, focusing on their sources of advice at various stages of their decision-making process. Therefore, we explored three cases in Greece using social capital as a heuristic device in understanding the grounded processes of farmers innovating trajectories amidst the weak and fragmented national AKIS – particularly under the adverse Greek advisory landscape. In this respect, interpretation has been prioritized over measurement.

Our results are, in general, in line with social capital theory as implemented in agriculture; that is, the important role of different types of social capital; closeness of actors and 'dark' capital; and trust for innovation; see conceptual framework. Furthermore, our results show that even in the absence of advisory services or links with such services (as a result of their abandonment by the public sector/ privatization as seen in two of the cases explored here), some farmers are ready to embrace new ideas. Disregarding the adverse context (i.e. the lack of (substantial) innovation support), farmers engage in innovating processes which are iterative, interactive and co-creational. In these cases, our research has also shown that the existence of actors championing the innovation and playing the role of network manager (i.e. the farmers who built a farmers' cooperative which, in turn, undertook such a leading role in the stevia case) is also important. Otherwise, especially along with the lack of appropriate education or training as seen in the avocado case, peer-to-peer exchanges may lead to repeated trial and errors.

In the cases explored one can also note that different (sociocultural, economic, environmental, historical, political, etc.) contexts within the country, farmers' motivations and the 'character' of innovations imply different farmers' microAKIS (see Sutherland et al. 2017). Furthermore, the diversity of actors from whom farmers seek advice is noted. That is, farmers enrol actors beyond those who might be or are usually expected to play such a role. Additionally, the role of hybrid actors has been underlined especially within uncoordinated (i.e. lack of advisory support and/or leading actor) innovation processes. Especially for Greece, the lack of any significant role of agronomists-input suppliers (who currently are the main 'advice providers' to farmers) is striking and shows that such private advice providers are rarely experts in the sense of being able to support innovations (beyond the, sometimes novel, inputs and equipment they sell to farmers) as they neither have links with research nor invest in research.

The analysis was made possible through the investigation of microAKIS; that is, the knowledge sources farmers personally assemble when innovating. Therefore, the notion of microAKIS proves extremely useful in identifying the (diverse) range of actors (including peers) providing advice to farmers at a local level, with reference to specific innovations/innovating processes. In parallel, the use of the Triggering Change Model as a methodological tool proved important in untangling what, till now, has been treated as a homogenous output (innovation adoption or not). The model enabled the identification of farmers' information and advice networks (re: social capital) underpinning decision-making in each stage of the innovating process. With regard to the model *per se*, one might consider ('dark' bonding) social capital as one of farmers' lock-ins. We suggest that such a framework may prove useful as a 'diagnostic tool' when planning interventions aiming at supporting innovations.

Given that this is an exploratory enquiry into staged innovating processes and the dynamics of respective networks based on three Greek cases, our findings need to be verified in future studies in terms of either the exploration of more or different cases along roughly the same lines. This includes further in-depth research, or more rigorous SNA and other quantitative methods on wider representative samples. Moreover, future research may shed ample light on such phenomena if the latter are taken as 'assemblages' farmers gather around them 'to get the work done'. Distinctive characteristics of assemblages are: first, that they are heterogeneous collections of actors (vs. conceptions of systems and/or networks as finite set or sets of actors; see Nieves and Osorio 2013). Second, that they are temporal in that they may well be differentiated during the innovating process as seen in the cases presented here, transformed as a result of their own activity or cease to exist after the end of the 'project' (see DeLanda 2006).

Finally, our findings point to the need to support and facilitate the building of farmers' 'bright' social capital (skilled facilitation; King et al. 2019); particularly farmers' networking (innovation brokerage; see Koutsouris 2018) vis-à-vis farmers innovating endeavours. In parallel, one has to keep in mind the likelihood of temporality; that is, that networks may (need to) change in various stages of the innovation journey. In particular, our findings verify and complement previous research concerning the (lack of) provision of extension and advisory services and thus of reliable knowledge and know-how to the Greek farming community (Koutsouris 2014). While this is an analytical study aiming at exploration rather than in providing normative descriptions on what should be done, finding support other research (e.g. Österle et al. 2016), that in Greece there is an urgent need for a clear, integrated and stable policy mix concerning the building of an enabling environment for innovation. This is particularly important to the current consultations for the design of the CAP Strategic Plan (2021–2017). This includes, support for the establishment of networks of advisors/innovation support services, the appropriate training of advisors/innovation brokers; and the establishment of mechanisms for the exchange of knowledge and/or problems. The latter includes the complete range of stakeholders and activities such as common seminars, workshops, demonstrations, exchanges and above all multi-actor collaborative projects (re: interactive innovation) such as Operational Groups (OGs-EIP). Farmers occupational education/training is also of major importance (see also EU SCAR AKIS 2019).

Note

1. The AgriLink project (Horizon 2020; https://www.agrilink2020.eu/) explores the roles played by advisors in farmers' decision-making by implementing cutting-edge research methods in a multi-actor, transdisciplinary context. AgriLink aspires to essentially contribute to enhancing the role of agricultural advisors and advisory services/providers by stimulating and facilitating sustainability transitions in the European agricultural sector.

Acknowledgements

The information and views set out in this publication are those of the authors and do not necessarily reflect the official opinion of the European Union. We gratefully acknowledge the contribution of all AgriLink project partners, especially the project and WP2 leaders and thank them for the cooperation. The authors would also like to thank the anonymous reviewers for their constructive criticism which contributed to the substantial improvement of the first draft of the current piece of work.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by H2020: [Grant Number 727577].

Notes on contributors

Alex Koutsouris is the Head of the Lab of Agricultural Extension, Agricultural Systems & Rural Sociology, Department of Agricultural Economics and Rural Development, Agricultural University of Athens. His research interests revolve around sustainable rural development focusing on topics such as agricultural extension (interactive innovation and communication), training and education, project design and evaluation, with emphasis on systemic and participatory approaches.

Eleni Zarokosta (MSc) is a PhD candidate working in parallel in the Lab of Agricultural Extension, Agricultural Systems & Rural Sociology, Agricultural University of Athens. She is mainly involved in H2020 projects and her main research interests lie in extension/advisory services, Farm Field Schools and network analysis.

References

Alexopoulos, G., A. Koutsouris, and I. Tzouramani. 2009. "The Financing of Extension Services: A Survey among Rural Youth in Greece." *The Journal of Agricultural Education and Extension* 15 (2): 177–190.

Beers, P. J., and F. Geerling-Eiff. 2014. "Networks as Policy Instruments for Innovation." *The Journal of Agricultural Education and Extension* 20 (4): 363–379.

Cofré-Bravo, G., L. Klerkx, and A. Engler. 2019. "Combinations of Bonding, Bridging, and Linking Social Capital for Farm Innovation: How Farmers Configure Different Support Networks." *Journal of Rural Studies* 69: 53–64.

Compagnone, C., C. Lamine, and L. Dupré. 2018. "The Production and Circulation of Agricultural Knowledge as Interrogated by Agroecology: Of Old and New." *Revue d'anthropologie des Connaissances* 122 (2): 111–138.

Cristóvão, A., A. Koutsouris, and M. Kügler. 2012. "Extension Systems and Change Facilitation for Agricultural and Rural Development." In *Farming Systems Research into the 21st Century: The New Dynamic*, edited by I. Darnhofer, D. Gibbon, and B. Dedieu, 201–227. Dordrecht: Springer Science.

DeLanda, M. 2006. *Anew Philosophy for Society: Assemblage Theory and Social Complexity*. London: Continuum.

EC. 2015. *Strategic Approach to EU Agricultural Research & Innovation*. https://ec.europa.eu/programmes/horizon2020/en/news/final-paper-strategic-approach-eu-agricultural-research-and-innovation.

EC. 2019. "Building Stronger Agricultural Knowledge and Innovation Systems to Foster Advice, Knowledge and Innovation in Agriculture and Rural Areas." https://ec.europa.eu/info/sites/default/files/food-farming-fisheries/key_policies/documents/building-stronger-akis_en.pdf.

EUROSTAT. 2019. *CAP Context Indicators – 24: Agricultural Training of Farm Managers*. https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf.

EU SCAR AKIS. 2019. *Preparing for Future AKIS in Europe*. Brussels: European Commission.

Faysse, N., M. T. Sraïri, and M. Errahj. 2012. "Local Farmers' Organisations: A Space for Peer-to-peer Learning? The Case of Milk Collection Cooperatives in Morocco." *The Journal of Agricultural Education and Extension* 18 (3): 285–299.

Fisher, R. 2013. "'A Gentleman's Handshake': The Role of Social Capital and Trust in Transforming Information into Usable Knowledge." *Journal of Rural Studies* 31: 13–22.

Hansen, B. G., and A. Greve. 2015. "The Role of Human and Social Capital in Dairy Farming." *Rural Society* 24 (2): 154–176.

Hermans, F., L. Klerkx, and D. Roep. 2015. "Structural Conditions for Collaboration and Learning in Innovation Networks: Using an Innovation System Performance Lens to Analyse Agricultural Knowledge Systems." *The Journal of Agricultural Education and Extension* 21: 35–54.

Iliopoulos, K., and V. Valentinov. 2012. "Opportunism in Agricultural Cooperatives of Greece." *Outlook on Agriculture* 41 (1): 15–19.

Ingram, J., P. Gaskell, J. Mills, and J. Dwyer. 2020. "How Do We Enact Co-innovation with Stakeholders in Agricultural Research Projects? Managing the Complex Interplay Between Contextual and Facilitation Processes." *Journal of Rural Studies* 78: 65–77.

Kansanga, M. M., I. Luginaah, R. B. Kerr, E. Lupafya, and L. Dakishoni. 2020. "Beyond Ecological Synergies: Examining the Impact of Participatory Agroecology on Social Capital in Smallholder Farming Communities." *International Journal of Sustainable Development & World Ecology* 27 (1): 1–14.

King, B., S. Fielke, K. Byne, L. Klerkx, and R. Nettle. 2019. "Navigating Shades of Social Capital and Trust to Leverage Opportunities for Rural Innovation." *Journal of Rural Studies* 68: 123–134.

Klerkx, L., and A. Proctor. 2013. "Beyond Fragmentation and Disconnect: Networks for Knowledge Exchange in the English Land Management Advisory System." *Land Use Policy* 30: 13–24.

Klerkx, L., E. P. Stræte, G.-T. Kvam, E. Ystad, and R. M. B. Hårstad. 2017. "Achieving Best-fit Configurations Through Advisory Subsystems in AKIS: Case Studies of Advisory Service Provisioning for Diverse Types of Farmers in Norway." *The Journal of Agricultural Education and Extension* 23 (3): 213–229.

Knierim, A., P. Labarthe, C. Laurent, K. Prager, J. Kania, L. Madureira, and T. Ndah. 2017. "Pluralism of Agricultural Advisory Service Providers – Facts and Insights." *Journal of Rural Studies* 55: 45–58.

Koutsouris, A. 2014. "AKIS and Advisory Services in Greece. Report for the AKIS Inventory (WP3) of the PROAKIS Project." https://proakis.hutton.ac.uk/sites/proakis.hutton.ac.uk/files/Country%20Report%20Greece%2003%2006%2014.pdf.

Koutsouris, A. 2018. "The Role of Extension in Agricultural Technology Transfer: A Critical Review." In *From Agriscience to Agribusiness – Theories, Policies and Practices in Technology Transfer and Commercialization*, edited by N. Kalaitzandonakes, E. Carayannis, E. Grigoroudis, and S. Rozakis, 337–359. Cham: Springer.

Koutsouris, A., and E. Zarokosta. 2019. "Supporting Bottom-up Innovative Initiatives Throughout the Spiral of Innovations: Lessons from Rural Greece." *Journal of Rural Studies* 73: 176–185.

Labarthe, P., and C. Laurent. 2013. "Privatization of Agricultural Extension Services in the EU: Towards a Lack of Adequate Knowledge for Small-scale Farms?" *Food Policy* 38: 240–252.

Madureira, L., A. Cristóvão, D. Ferreira, and T. Koehnen. 2019. "Actors, Roles and Interactions in Agricultural Innovation Net-works: The Case of the Portuguese Cluster of Small Fruits." In *New Metropolitan Perspectives. ISHT 2018. Smart Innovation, Systems and Technologies*, edited by F. Calabrò, L. Della Spina, and C. Bevilacqua, 42–49. Cham: Springer (Vol. 101).

Magala, D. B., M. N. Mangheni, and R. F. Miiro. 2019. "Actor Social Networks as Knowledge Sharing Mechanisms in Multi-stakeholder Processes: A Case of Coffee Innovation Platforms of Uganda." *The Journal of Agricultural Education and Extension* 25 (4): 323–336.

Nieves, J., and J. Osorio. 2013. “The Role of Social Networks in Knowledge Creation.” *Knowledge Management Research & Practice* 11 (1): 62–77.
Oreszczyn, S., A. Lane, and S. Carr. 2010. “The Role of Networks of Practice and Webs of Influencers on Farmers’ Engagement with and Learning About Agricultural Innovations.” *Journal of Rural Studies* 26: 404–417.
Österle, N., A. Koutsouris, Y. Livieratos, and E. Kabourakis. 2016. “Extension for Organic Agriculture: A Comparative Study Between Baden-Württemberg, Germany and Crete, Greece.” *The Journal of Agricultural Education and Extension* 22 (4): 345–362.
Papaspyrou, S., and A. Koutsouris. 2018. “The Educational Philosophy of Greek Extensionists vis-à-vis Contemporary Extension Thinking: A Critical Appraisal.” *The Journal of Agricultural Education and Extension* 24 (4): 345–360.
Prager, K., P. Labarthe, M. Caggiano, and A. Lorenzo-Arribas. 2016. “How Does Commercialisation Impact on the Provision of Farm Advisory Services? Evidence from Belgium, Italy, Ireland and the UK.” *Land Use Policy* 52: 329–344.
Ragkos, A., G. Papoutsi, and M. Bardouniotui. 2019. “Why Invest on Innovative Production? A Qualitative Evaluation of the Emerging Avocado Sector in Crete, Greece.” Paper presented in 10th International Agricultural Symposium - AGROSYM 2019, Jahorina (Bosnia and Herzegovina), October 3–6.
Rogers, E. M. 1983. *Diffusion of Innovations*. New York: Free Press.
Sumane, S., I. Kunda, K. Knickel, A. Strauss, T. Tisenkopfs, I. des Ios Rios, M. Rivera, T. Chebach, and A. Ashkenazy. 2018. “Local and Farmers’ Knowledge Matters! How Integrating Informal and Formal Knowledge Enhances Sustainable and Resilient Agriculture.” *Journal of Rural Studies* 59: 232–241.
Sutherland, L. A., and R. Burton. 2011. “Good Farmers, Good Neighbours? The Role of Cultural Capital in Social Capital Development in a Scottish Farming Community.” *Sociologia Ruralis* 51 (3): 238–255.
Sutherland, L. A., R. Burton, J. Ingram, K. Blackstock, B. Slee, and N. Gotts. 2012. “Triggering Change: Towards a Conceptualisation of Major Change Processes in Farm Decision-making.” *Journal of Environmental Management* 104: 142–151.
Sutherland, L. A., L. Madureira, V. Dirimanova, M. Bogusz, J. Kania, K. Vinohradnik, R. Creaney, D. Duckett, T. Koehnen, and A. Knierim. 2017. “New Knowledge Networks of Small-scale Farmers in Europe’s Periphery.” *Land Use Policy* 63: 428–439.
Tisenkopfs, T., I. Kunda, and S. Šūmane. 2014. “Learning as Issue Framing in Agricultural Innovation Networks.” *The Journal of Agricultural Education and Extension* 20 (3): 309–326.
Tregea, A., and S. Cooper. 2016. “Embeddedness, Social Capital and Learning in Rural Areas: The Case of Producer Cooperatives.” *Journal of Rural Studies* 44: 101–110.
Vlahos, G., P. Karanikolas, and A. Koutsouris. 2017. “Integrated Farming: A Transition-to-sustainability Perspective.” *International Journal of Agricultural Resources, Governance and Ecology* 13: 43–59.
Wood, B., H. Blair, D. Gray, P. Kemp, P. Kenyon, S. Morris, and A. Sewell. 2014. “Agricultural Science in the Wild: A Social Network Analysis of Farmer Knowledge Exchange.” *PLoS ONE* 9 (8): e105203.

Appendix

Table A1. MD awareness – contact frequencies

Frequency of contact	FBO	Independent advisor	Input companies	Clients, traders, etc.	R&E	Neighbour farmer or peer	Other
Just once	3	3		3	1	2	
Sporadic	3	5	4	1	1	3	
Frequent	19	21		1		6	
Constant	1				1	1	1
Total	26	29	4	5	3	12	1

Table A2. MD assessment – contact frequencies.

Frequency of contact	FBO	Independent advisor	Input companies	Clients, traders, etc.	Business partner	Neighbour farmer or peer	Friends and family	Other
Just once								
Sporadic	6	3	1					
Frequent	20	24	1	3	1	12	1	1
Constant	1	1				2		
Total	27	28	2	3	1	14	1	1

Table A3. MD implementation – contact frequencies

Frequency of contact	FBO	Independent advisors	Input companies	Clients, traders, etc	Neighbour farmer or peer	Other
Just once						
Sporadic	3	3	1			
Frequent	11	15	2	2	4	1
Constant	1	1			1	
Total	15	19	3	2	5	1

Table A4. Avocado awareness – contact frequencies

Frequency of contact	FBO	Clients, traders, etc.	Business partner	R&E	Local Dir of Agriculture	Neighbour farmer or peer	Friends and family	Other
Just once	1	1		1				1
Sporadic	1			3	1	4		
Frequent		4	1	7	5	9	1	2
Constant					1	8	5	
Total	2	5	1	11	7	21	6	3

Table A5 : Avocado assessment – contact frequencies

Frequency of contact	FBO	Input companies	Clients, traders, etc.	Business partner	R&E	Local Dir. of Agriculture	Neighbour farmer or peer	Friends and family	Other
Just once					1				
Sporadic	1	1	3		6	1	3		
Frequent	1	1	5	1	5	6	12	1	
Constant			1		2	3	8		1
Total	2	2	9	1	14	10	23	1	1

Table A6. Avocado implementation contact frequencies

Frequency of contact	FBO	Input companies	Clients, traders, etc.	R&E	Local Dir. of Agriculture	Neighbour farmer or peer	Other
Just once		1	1				
Sporadic	2	2	2	7	3	6	1
Frequent	6		8	5	6	13	1
Constant		1				1	1
Total	8	4	11	12	9	20	3

Table A7. Stevia awareness – contact frequencies

Frequency of contact	FBO	Clients, traders, etc.	R&E	Ex-researcher	Neighbour farmer or peer	Friends and family	Other
Just once	1	1	15	9	1		1
Sporadic	4		3		5	2	1
Frequent	3	3		1	9		2
Constant					7	2	
Total	8	4	18	10	22	4	4

Table A8. Stevia assessment – contact frequencies

Frequency of contact	FBO	Clients, traders, etc.	R&E	Ex-researcher	Neighbour farmer or peer	Friends and family	Other
Just once		2	5	4			
Sporadic	8	1	4	1	1	1	1
Frequent	9	1	9	3	8	4	1
Constant	1				12	2	
Total	18	4	18	8	21	7	2

Table A9. Stevia implementation – contact frequencies

Frequency of contact	FBO	R&E	Ex-researcher	Neighbour farmer or peer	Friends and family
Just once					
Sporadic		4	2		
Frequent	7		1	3	
Constant	2	1		8	1
Total	9	5	3	11	1