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Local Innovation Networks in Raisin Production in Kapanci Village of Salihli County of Manisa Province of Turkey

Türkiye'de Manisa İli Salihli İlçesi Kapancı Köyü'nde Çekirdeksiz Kuru Üzüm Üretiminde Yerel İnovasyon Ağları

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ABSTRACT

Lokal knowledge and innovation networks for raisin production were examined by using the participatory methods in Kapanci Village (Salihli County, Manisa Province, Turkey) in this study. Farmers; extension staff (public and chamber of agriculture); input dealers; researchers were participated in the discussion sessions. Market opportunities, needs, plant protection efforts, competition and crises are determined as drivers in learning and adoption of innovations. Increases in production costs have accelerated the technology (materials, equipment, etc.) adoption tendency in the village. Farmers in the village have high problem solving skills. The most important actors in the networks appear to be input dealers and private companies. The farmers think that local knowledge and practices are insufficient in today's farming climate. The farmers do not believe that their priorities and problems are sufficiently considered in the research and extension agenda in the region. Farmers' linkages with public extension services are generally weak. According to the farmers public extension advices are usually theoretical and limited economic validation. The local innovation networks in the raisin production can thus be defined as market-orientated and pluralistic but have weak links with the formal knowledge and innovation systems.

Anahtar Sözcükler:

Yerel bilgi ve inovasyon ağları, sosyal öğrenme, tarımsal yayım

ÖZET

Bu çalışmada Kapancı Köyü'nde (Salihli İlçesi Manisa İli, Türkiye) çekirdeksiz kuru üzüm üretimindeki yerel bilgi ve inovasyon ağları katılımcı yöntemler kullanılarak incelenmiştir. Çiftçiler, yayım elemanları (kamu ve ziraat odası); girdi satıcıları, araştırmacılar tartışma oturumlarına katılmışlardır. Piyasa fırsatları, gereksinimler, bitki koruma çabaları, rekabet ve krizler öğrenmede ve yeniliklerin benimsenmesinde yönlendiriciler olarak belirlenmiştir. Üretim maliyetlerindeki artış köyde teknoloji (alet-ekipman, materyal vb.) benimsenme eğilimini artırmıştır. Köydeki çiftçiler yüksek problem çözme becerilerine sahiptirler. Ağdaki en önemli aktörler girdi satıcıları ve özel firmalar olarak görülmektedirler. Çiftçiler yerel bilgi ve uygulamaların bugünkü tarım koşullarında yetersiz kaldığını düşünmektedirler. Çiftçiler kendi önceliklerinin ve koşullarının bölgedeki araştırma ve yayım etkinliklerinde yeterince gündeme alındığına inanmamaktadırlar. Çiftçilerin kamu yayım örgütleri ile bağlantıları genel olarak zayıftır. Çiftçilere göre, kamu yayım önerileri genellikle teorik olup, ekonomik geçerlilikleri sınırlıdır. Kuru üzüm üretimindeki yerel inovasyon ağları piyasa yönlendirmeli ve çoğulcu fakat formal bilgi ve inovasyon sistemleri ile zayıf bağlara sahip olarak tanımlanabilir.

INTRODUCTION

Today, rural life and agricultural production systems face many new challenges on domestic and global contexts, such as higher awareness of ecological impacts, increased concerns about quality, safety of products, public health, and international trade competition. These challenges demand a higher level of integration of knowledge and services than is required for on-farm problems and encourage local participation and client-oriented structures in extension services (Csaki, 1999; Werrij, 2005; Boz and Ozcatalbas, 2010; Hartwich and Scheidegger, 2010 Falloon, 2011). Innovation is not a linear process, in which research results are just transferred to farmers by extension

services (Perez, et al, 2010). Research institutions have been accepted as the basic actors of creating knowledge and innovation in conventional farming systems. It creates innovation and extension introduces them to the users. According to Munyua, Adams and Thomson (2002), collaboration, bottom-up information flows and horizontal linkages among contributors should characterize the model for sustaining knowledge and innovation networks. Dynamic and interactive structure of networks depends on existence of social learning skills. Studies on innovation indicate that ability to innovate is often related to collective action and knowledge exchange among diverse actors, incentives and resources available for collaboration (World Bank, 2006). Local innovation networks (LINs) make flows of relevant and reliable information and learning processes possible between individuals/actors (SOLINSA 2010).

LINs contain the links among the producers, users, experts, and formal AKS (Agricultural Knowledge System) components that create mutual engagement around sustainability goals in rural development. They co-produce new knowledge by creating conditions for communication, share resources and cooperation on common initiatives. LINs as alternative knowledge systems are constituted by communication patterns, infrastructures, access to information and validation of information. The principle of LINs is based on social learning and correlation of knowledge as opposed to the "transfer of knowledge". Social learning as interactive process occurs when the experiences, ideas and environment are shared with others (Oreszczyn, et al., 2010). Participation of diverse actors is advantageous for diverse forms of learning and knowledge flow, leading to innovations and social change.

Today's rural development and innovation approaches mostly focus on local assets and opportunities for creating the agenda. The approaches consider local networks and social learning process in communities for strengthening interactions among the actors. In this context, this study aims at to describe diffusion of innovations and, the linkages and integration of a raisin production network at the village level. Turkey produces about 30% of the global supply of raisins, with an export value of $490 million and a production output of 300,000 ton in 2013 (Anonymous, 2013). About 90% of raisin production of Turkey comes from Manisa Province (manisa.tarim.gov.tr//tarimsalveriler, 2017).

MATERIAL and METHODS

In the study, participatory techniques were employed for data collection and group discussions. The sessions were held in the coffee house in the village, especially at night. Six sessions were carried out with between 6-13 participant farmers. These farmers were volunteers and representing average farmers of the village profile. Support from public extension worker was obtained during selection of farmers for the sessions. The questions were prepared before going to the meetings and written on large sheets of paper. These questions also describe the purposes of study. Visual materials, such as Venn diagrams, a matrix, time flows charts, and Likert scales to score some key questions (with a score ranging from between 1 (strongly disagree) and 5 (strongly agree)) were used during the discussions. Colored stickers were used to record participants stated preferences. The same methods were used to gather data from extension staff. In total, 10 respondents from Chamber of Agriculture and Public Extension Service in Salihli County participated in the sessions. In addition to group methods, the interviews were also used for data collection with four input dealers, an agent from a private company and three public researchers from Horozkoy Viticulture Research Institute. The study was conducted in the summer of 2014. The main topics/questions covered in the group/interview discussions are as follows:

- Chronology of grape production in the village
- The methods employed in learning
- Importance of local knowledge and practices
- Knowledge and innovation flows in the village
- Why farmers do/do not adopt innovations
- The priority and objectives of the actors
- Relations with research and the university
- Description of the LINs in the village

RESULTS and DISCUSSIONS

Information on the study area

Kapanci Village is 9 km away from Salihli County and 46 km away from Manisa Province. It was founded (1927) as a neighborhood of town Sart (Sardis) and became a village in 1937. It has a population of approximately 1170 and there are 360 grape growers in the village. Raisin production in the village accounts for 1400 hectares of land. Other important crops are vegetables, potatoes and maize. Furthermore, there are about 800 cows, 300 cattle and about 400 sheep in the village. Less than 1% of the village farmers have no land. These people provide agricultural labor.

Although the development cooperative was founded 12 years ago, only about 10% of farmers in the village are members. The number of farmers who are members to TARIS (the regional agricultural sales

cooperative on cotton, dried fig, olive oil and raisin marketing in the Aegean Region) are about 28%. Roughly 50% of farmers sell raisins to intermediary traders, 40% sell to exporters and 10% to TARIS in the village.

The chronology of grape production in the village

Grape production started in 1952. The inputs of the green revolution have been used extensively for raisin production since the 1970s. Organic production began in the 1980s. and today, 10% of farmers deal with organic farming in the village. Economic developments have shaped production patterns. Because of market circumstances, the production of cotton was abandoned completely in the village in 2003. Today all farmers in the village grow grapes for raisin. Raisin yields increased about 216% from 1958 to 2013 (in 55 years) (Table 1).

Table 1. Chronology of agriculture and viticulture in Kapaci Village

Years	Developments
1952	The first vineyard was established.
1955	The first tractor was purchased.
1958	The raisin yield was 3000 kg per hectare.
1970	30% of farmers grow grapes for raisin production.
1981	The first high system vineyard was established.
1984	About 50% of farmers grow grapes for raisin. All farmers utilize chemical inputs such as pesticides, fertilizers, etc. Everyone owns a tractor. Organic raisin production began.
2003	Cotton farming abandoned completely (land use for vegetables and vineyards increased)
2013	The raisin yield reached 6500 kg per hectare. 10% of farmers grow organically

Learning ways of farmers

Learning is an important factor which motivates change and the success of learning is increased with the usage of different techniques. In the village, the usage level of individual methods is high. Face-to-face contacts mostly occur in coffee houses and input seller shops. The tendency of having immediate communication via cell phone is also high. According to the farmers meetings, demonstrations, field days and tours are organized in limited numbers.

TV programs, posters and brochures are the main media-based tools used. In the last few years, the number of farmers using the internet to find out about innovations and weather forecasts has increased. Information is also provided by public extension services via SMS, especially regarding plant protection applications. In general, private companies, input dealers, the internet, extensionists, other farmers are more preferable information sources for getting information and innovation in raisin production. Input dealers often use individual methods, field visits and demonstrations, whereas public extensionists and advisors in the Chambers of Agriculture often use individual methods and farmer meetings to transfer knowledge about innovations. While farmers buy the inputs, technical advice is also given to farmers. Input dealers visit vineyards and provide extension services. Public extension workers and advisors in the Chamber of Agriculture provide information to raisin growers in the village, too. When farmers face problems, they consult other farmers in the village. If they cannot find a solution, they call private consultants or input dealers. Farmers need to know are product quality, sales/marketing, organization skills and consumer preferences. According to farmers, market opportunities, needs, plant protection, competitiveness and crises as water, energy, etc. are mentioned as the triggers learning and innovation. The farmers commented that coffee house meetings are quite useful. Presentations and discussions among attendants are shown as common techniques in learning. Moreover, field days and demonstrations are found to be very effective. In the village, learning by seeing and doing are the most popular learning techniques, as they are everywhere. Seeing the result and making comparison facilitates adoption. Farmers stated that learning from their colleagues is more convincing.

Importance of local knowledge and practices

The farmers believe that local information is no longer sufficient. For example; changes in irrigation applications require, for example, more than local know how. The complete change of production patterns in the last 30 years and subsequent technologic developments have meant that old farmers' knowledge is invalid and insufficient. Some examples of local knowledge in the village include:

- the copper vitriol and powdered sulfur application systems;
- no application during the bloom period;
- young buds are not cut until 21st June each year;
- irrigation in the vineyard is not started before combustion;
- insect outputs observed in the light of the moon (today, traps are used);
- grape harvest starts each year on 20th August.

Extensionists are not in favour of copper vitriol and powdered sulfur applications since repetitions are needed after rain. For this reason they advise systemic chemicals. Farmers who follow the traditional system make an application of copper vitriol and powdered sulfur when the sun shines just after the rain.

The farmers find some extension advices costly. For example, they prefer to use less fertilizer according as a result of soil analysis. One of the sustainable applications is an animal manure usage but the absence of a place to keep the manure is seen as an important obstacle.

Due to researchers, the farmers trust their own experience/applications on the subjects of plant protection and feeding. The researchers believe that about 40% of farmer information is local knowledge. For instance, farmers they prefer pruning time when there is no moon light as the insect population is higher in this period and they hide out in the pruning slits. Researchers said that local knowledge has not been a subject for research but, different farmer applications in pruning are being monitored closely. According to the researchers, farmers start to harvest in vineyards on the 20th of August. In this case, 1 kg of raisin is produced from 5 kg of fresh grapes. When the harvest is made due to solids, 1 kg of raisin is produced from 4 kg (even less) of fresh grapes. Because of the rain risk during the drying process, farmers prefer an early harvest. For the quality of raisin, researchers and extension advisors have made suggestions about high system drying in the last 30 years. Traditionally grapes are dried in 7-8 days on the ground and 13-14 days on high system drying. Because of the establishment and labour costs of high system drying farmers mostly prefer the traditional ground drying system.

According to the input dealers, 80% of farmers' applications are based on local knowledge, which includes, for example, not entering the vineyard and not spraying pesticides during the bloom period. However, fertilization and irrigation must also be done in this period. Input dealers transform farmers' knowledge and applications into extension advice and share the results of innovations with company representatives. Advisors in the Chamber of Agriculture think that about 10% of farmers' applications are local knowledge but the usage rate of local knowledge changes according to the subject.

The diffusion of innovations

Coffee houses are important socio-cultural centers in the rural area in the most part of Turkey. There are two coffee houses in the village. All of the farmers visit these coffee houses. They are opened at 5am and closed at about 11pm. Farmers have contacts with each other, traders, extension workers, etc. in the coffee houses for information transfer and commercial agreements. Almost all farmers in the village share their information and experiences. The farmers learn most effectively by hearing and seeing from each other.

There are 10 opinion leaders (2.8% of the growers) in the village. These farmers have more frequent contacts with outside the village and they share information with other farmers. Input dealers and private companies are the most effective actors in terms of diffusing innovations to the village. Communication is provided with the input (pesticides, fertilizer, etc.) dealers about buying and using. Input dealers visit vineyards and conduct demonstrations. Cooperation between farmers and public extension offices is insufficient. According to the farmers, extension advices are theoretical and not practical in the field. The consultants in organic farming help in terms of knowledge transfer and marketing. Farmers are in cooperation with TARIS (the regional agricultural sales cooperative), private consultants and traders, too. Farmers can produce local innovations about soft technologies like pruning techniques. These innovations, which originated in farmer contexts, diffuse fast in the village. Farmer-to-farmer transfer about innovations application is the main means of diffusion.

Innovations and adoption

Innovations gain importance to earn more, to produce quality and to decrease costs. In the last four years, three of the grape growers (there are 360 grape growers in the village) started to produce a new table grape variety. Workers who come from another village prune and in doing so bring new pruning techniques and undercutting bunch of grapes. Siphon irrigation has been learnt from consultants and these techniques are now common place.

In terms of plant protection and fertilization applications, input dealers, extensionists (public or else), and pesticide companies are effective. Potassium leaf fertilizers have been utilized in the last decade in the village. As a result of drip irrigation, the amount of fertilizer usage has decreased by significant levels. In the previous application, 150-200 kg nitrogen fertilizers were given per hectare, but with drip irrigation the amount has decreased to 50 kg. For the last 30 years, 400 liters tanks have been used in spraying, but for the last few years 1-2 ton tanks have been used and fuel costs for spraying has been reduced significantly. According to the farmers participating in the sessions, adoption rates of the innovations which were introduced in the village in last decade are remarked as drilling machine %100; spring hoe machine %100; new fertilizers (potassium, leaf fertilizers, etc.) %100; large capacity sprayer tanks %80; V System %50; adhesive traps (for plant

protection) %40; drip irrigation; %30; new grape varieties %1 by the farmers. Soft technologies (methods) were adopted faster 15 years ago compared to hard technologies (tools, equipment, material) but the increase in production costs has also accelerated the adoption tendency of hard technologies. Large farms (in this case over 2.5 hectares vineyards) and more educated farmers adopt innovations more easily. The important obstacle in adoption of innovations is the absence of resource. Other main obstacles are customs and distrust (Table 2).

Table 2. According to the actors why farmers do not adopt the innovations in the village

Reasons	Farmer	Public ext. worker	Advisor in the chamber of agric.	Input dealers	researcher	mean
Absence of resources	5	4	4	4	4	4.2
Customs	1	3	3	4	5	3.2
Unsuitable conditions of farmers	1	2	2	3	4	2.4
Differences on priorities.	1	2	2	3	4	2.4
Distrust	1	3	3	2	3	2.4
Low level education	1	3	3	1	3	2.2
Lack of skills	1	2	2	1	2	1.6
Lack of information	1	2	2	1	1	1.4

Scale: 1 not a priority; 2 low priority; 3 medium priority; 4 high priority; 5 essential

Sources of innovations

While examining innovations and their sources in grape production in the last decade, ten stickers were given to each farmer. The farmers were asked to distribute the stickers (each representing an innovation) in relation to innovation sources on a matrix. The process was repeated with advisors and input dealers. The share of innovation sources in the system has been calculated (see Table 3). According the stickers distributed input dealers, public extension, private consultants, internet, farmers, and researchers are the important innovation sources of the local networks.

Table 3. Innovation sources in raisin production in the last decade

Innovation sources	Farmer	Public extensionist	Advisor in the chamber of agriculture	Input dealers	Mean
Input companies	30	25	22	85	39.5
Public extension	12	21	9	-	11.8
Consultants	25	10	9	-	11.5
Internet	2	10	19	10	10.3
Farmers	17	5	12	5	9.8
Research	3	21	4	-	7.0
Book, journal, etc.	1	3	10	-	3.5
Chamber of agric.	10	-	3	-	3.3
University	-	-	11	-	2.8
Traders	-	5	1	-	1.5
Total	100	100	100	100	100.0

Information/innovation comes mostly to input dealers via companies. Input dealers have contact with different sources to understand the accuracy of their advice. According to input dealers, being useful, solving problems and commercial benefits are important motivational factors in their learning. Information flows between university staff and researchers on the ground are quite limited in the network. Advisors in the Chamber of Agriculture mostly learn information and innovation from input dealers, internet, farmers and university. However, the validity of information sourced via the internet is confirmed from different actors and then transformed into extension advices. Moreover, there are rare applications which are learnt from farmers and turned into extension advices. According to the advisors, private companies are very effective in the innovation process and the Ministry of Agriculture directs the network via agricultural support, subsidies, regulations, etc.

Relations and interactions with the research community

There is a viniculture research institute 45 km from the village. In the 1990s there had been farmers who had bought plants, but in the following years there had been very few farmers who had visited the institute. Today, the farmers in the village have no idea about the studies which are conducted in the institute and they do not even know whether there

are studies related with their problems or not. According to the researchers, less than 5% of grape growers in Manisa Province visit the institute. Farmers who come to the research station mostly do so to purchase plants and continue their relationships with the research later on. Research-extension relations are defined with the adjective "good". In-service training is given to extension workers by researchers and joint activities are organized for farmers.

When there is a problem related with the vineyard, researchers firstly examine and then analyze plants/vines in the laboratory. They also take opinions from various researchers due to their specializations. The relation between public extension and research is therefore moderate; the relations of input dealers with research and universities are very weak in the region. The relations of public extension and input dealers with private companies are strong in Salihli County. There are advisors in the Chamber of Agriculture (Salihli County) who report problems farmers face in the field to researchers. Ege University Faculty of Agriculture (in Izmir Province) is 100 km from the village. Farmers in the village have never visited the faculty which was established in 1955.

Farmers felt that their expectations are not taken into consideration by research, extension and universities sufficiently. They also commented about the weakness of relations with public extension, except for bureaucratic affairs. In the study, the main targets of agricultural production have been placed in the preference matrix and dual comparisons have been made. The target of farmers firstly focuses on economic benefits. The other actors give priority to subjects related to the environment and farmer/consumer health. Farmers stated that if they had economic satisfaction, they would become more concerned about environment and health-related issues (Table 4).

Table 4. Comparison of the priority objectives of the actors in the network

Priority	Farmer	Public extension	The chamber of agriculture	Input dealers	Research
1	Reducing the cost	Farmer/consumer's health	Raisin quality	Raisin quality	Raisin quality
2	Yield increase	Environmental protection	Yield increase	Environmental protection	Yield increase
3	Raisin quality	Raisin quality	Farmer/consumer's health	Farmer/consumer's health	Reducing the cost
4	Farmer/consumer's health	Reducing the cost	Reducing the cost	Reducing the cost	Environmental protection
5	---	Yield increase	Environmental protection	Yield increase	---

Collective action attitudes

As a result of the socio-cultural structure, farmers share their knowledge and experience with each other like other farmers all around the world. Especially when a problem occurs about the vineyard, sharing of information becomes faster and more frequent. Economic expectations and supports are seen as opportunities in the strengthening of the network. Farm size and as a result income differences are mentioned to be factors which obstruct cooperation. However, low production costs and quality raisin production makes the network stronger. Economic expectations and better quality production increase cooperation in the village.

The farmers stated that they warned each other about the applications of plant protection. Less than 1% of the farmers do not want to share their experience with others in the village. The farmers stated that they do not need much help from each other and they are individual enterprises since they have their own equipment. However, common benefits sometimes encourage common action. For example; in 2013, 20 farmers bought pesticides together and got a discount of 35% from the company. It is thought that this experience is going to motivate the desire of collective action in the future.

According to researchers financial support and benefits also encourage actor linkages in the networks. Input dealers think that if mutual benefits occur, common actions can be realized. For example, in plant protection applications adhesive traps are used and spraying time is announced and farmers follow the announcements in the village. According to advisors in the Chamber of Agriculture, factors like economic reasons, unreliability, jealousy and absence of leader farmers affect common action in the village. Collaboration mechanisms such as demonstrations, field days, meetings, tours and periodic visits to each other can provide sustainable linkages in the networks.

CONCLUSIONS

According to the findings, the LINs can be described as market-based and pluralistic, with a well-developed communication and network among

farmers. However, there are weak linkages between farmers and formal AKS components, such as research, university, and public extension. There is a well-developed process of co-learning between farmers, although this is very informal. Governance structure can be described as top-down information flows into the network. Market opportunities influence the adoption of innovations. Sustainability of the system depends on economic validation of innovations and beneficial gains of farmers. It can be said that the village has a well-developed LINs, through strong communication among farmers and good skills in terms of problem solving of farmers.

Agricultural knowledge and innovation flows and linkages among the actors are summarized in Figure 1. Farmers' social networks are central for facilitating the learning process in the village. The most important actors are input dealers and private companies. They sell inputs and also give extension advices to farmers. Input dealers have some relations with public extension organization and the Chamber of Agriculture for extension activities, such as demonstrations, field days, etc. The Chamber of Agriculture started to employ extension staff to link with farmers. Some of the companies have strong international linkages. The performance of public extension staff is reduced because of their bureaucratic burden. The research institute and university have quite limited contacts with other actors in the network. Market opportunities on raisin quality are an important component for international trade. Some farmers have contact with private consultants and organic companies. These farmers do not hesitate to share information with conventional farmers (Figure 1). The finding and results on innovation network of village can be summarized as below:

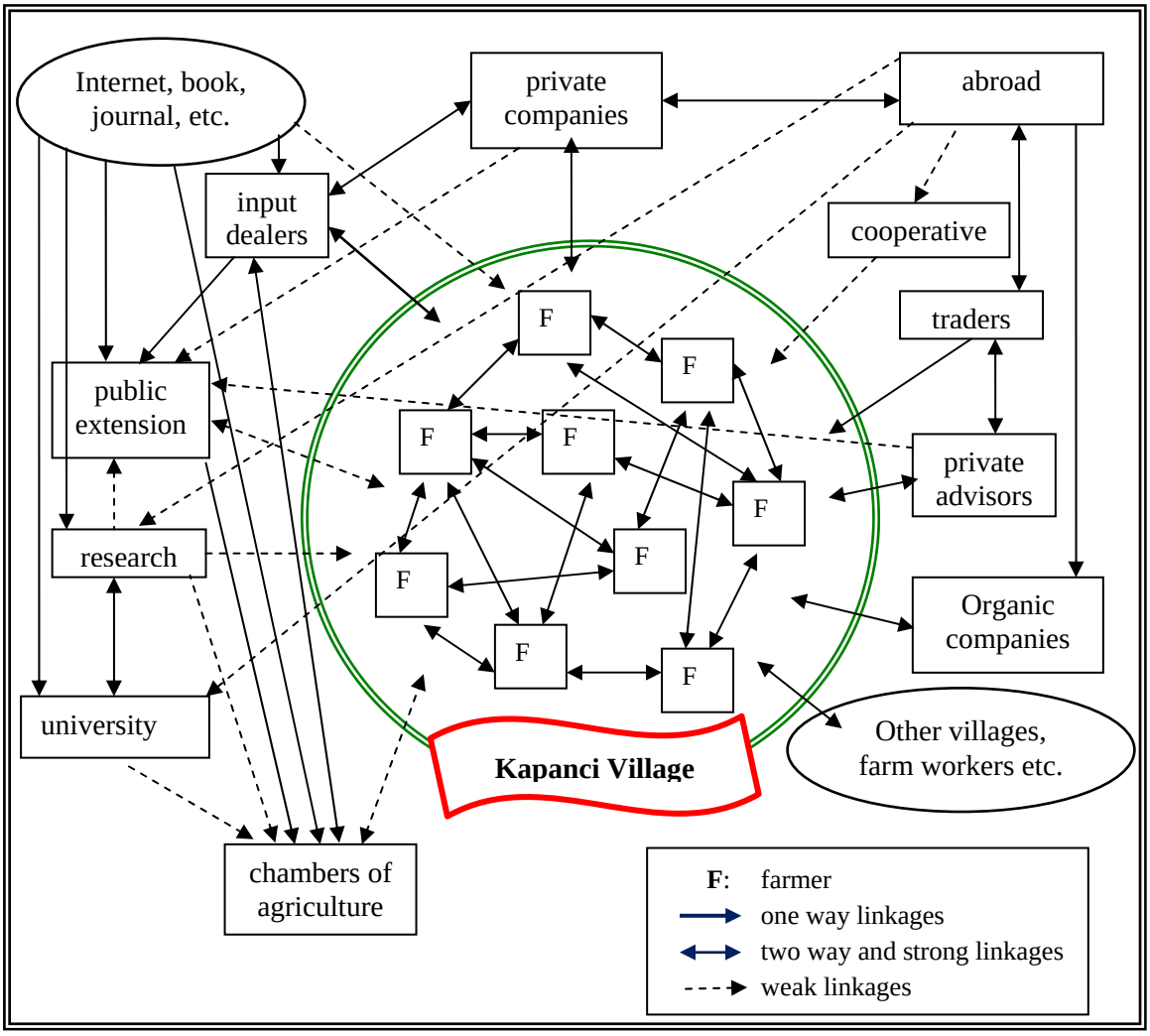

Figure 1: Knowledge and innovation flows in Kapanci Village

- The Chamber of Agriculture started to employ advisors (following the meetings in this study, 30 farmers signed contract with these advisors to receive extension services).
- Although, there are some 'innovator farmers' who bring new practices to the village but insufficient leadership is an important problem for collective action.
- The linkages between farmers and research are very poor in the village (following the discussions farmers decided to visit the viticulture research station after grape harvest).
- Different mechanisms of learning commonly co-exist, including peer-to-peer learning, knowledge transfer and dissemination/experience sharing.
- Farmers have a high degree of independence in deciding on what to learn.
- Knowledge learned elsewhere is mainly transferred verbally between the farmers.
- Informal individual networks are the most important component for learning.
- Private companies and input dealers are seen as the main players.
- Local experiences do not take place in the formal AKIS sufficiently.
- Local priorities, circumstances and knowledge in the village must be considered in the networks for empowering LINs.
- For creating a trustworthy environment and stronger linkages in the networks joint activities must be regularly organized at the field level.

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