



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Understanding networks in local food systems: the meeting of farmers and commercial actors

R. Filippini¹, E. Marraccini², S. Lardon^{1,3}

¹ AgroParisTech, UMR 1273 Métafort, Aubière (France)

² UP 2012-10-103 PICAR-T, Institut Polytechnique LaSalle Beauvais-Esitpa (France)

³ INRA & AgroParisTech, UMR 1273 Métafort, Aubière (France)



**Paper prepared for presentation at the 149th EAAE Seminar ‘Structural change in agri-food chains: new relations between farm sector, food industry and retail sector’
Rennes, France, October 27-28, 2016**

Copyright 2016 by R. Filippini, E. Marraccini, S. Lardon. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Abstract

Recent literature has claimed for a better understanding of food networks, especially in the case of local food systems. Studies should consider the social and territorial dimension of local food networks, in order to understand how they are established and to assess their effective sustainability. The aim of this contribution is to develop a methodology to perform a spatial network analysis in order to include both the territorial and socio-economic dimensions of local food networks, starting from the point of view of farmers. The methods has been applied on 14 livestock producers and on the processors and different sellers and distributors they are related to. The case study is the periurban area of Pisa, in Italy. Seven Local Food Networks Types result from the first step of analysis, showing a high degree of initiatives organised by farmers to maintain the products locally. Especially while the production and the sale of the product is located at the local area, most of the processing is done outside the local area, demonstrating that different actors provide a different definition of what is “local”; moreover the spatialisation demonstrates the high degree of fragmentation of the local food supply from local farmers to local spaces of sale (groceries, restaurants, etc.). Finally the constraints analysis applied on farmers, processors, and sellers demonstrate a lack of coordination of individual initiatives which may undermine the future sustainability of local food system.

1. Introduction

1.1. Networks Analysis: Place matters

A network is commonly defined as a collection of point – the nodes – joint by lines – the edges. In social sciences, the nodes are the actors, who are somehow related one to another (Wielinga *et al.*, 2008). The network’s analysis have been especially applied on food chains’ analysis, in order to distinguish the term “network” to the term “chain”. While the latter refers to the linear integration of actors depending on their reciprocal power (Murdoch, 2000), the term “network” deals with a more integrated analysis of how the actors are organised (Torre and Rallet, 2005), paying attention to the social nature of relationships (Lockie and Kitto, 2000). According to Reynolds (2004), studies on food networks will help in avoiding an extremely conceptualization of the linear sequence of actions from production, to distribution and consumption, in order to understand how actors perform the relationships, since in the agro-food networks a multiple set of social, economical, political influences may play a key role. This perspective should be especially applied in studies about how local actors are able to maintain agro-food networks, and to define the production and consumption patterns of food at territorial level (Lockie and Kitto, 2000), as such periurban areas. In fact, in this type of studies the emphasis is on how different local actors shape the process of localisation: “we have to observe how different sets of people and agencies are trying to define the production and consumption of food” (Lockie and Kitto, 2000, p. 9).

In general a LFS is defined as a system “in which foods are produced, processed and retailed within a defined geographical area” (Kneafsey *et al.*, 2013). In the Local Food System (LFS) analysis, several approaches have tried to go beyond the linear dimension of food chains, applying a network perspective. For example, studies on network analysis applied on local agro-food system have been focused on how ties are established (e.g.

Crespo et al, 2014), or on the nodes' density and directions (Chiffolau and Touzard, 2013).

In LFS approaches, the core of the analysis is the emphasis on the “spatially bound food supply chains” (Wiskerke, 2009), which defines the commercial relationships between farmers and consumers and the stakeholders connected to them. The term clearly reflects the importance that both social and spatial elements have in these commercial relationships. Nevertheless, while there are several studies on social network analysis in LFS (e.g. Chiffolleau and Touzard, 2014; Crespo et al., 2014; Belletti et al, 2012; Wiskerke, 2009), there's a lack in putting together such network analysis with a spatial one. For example, Ilbery and Maye (2006) proposed to integrate the territorial dimension in the analysis of the food networks put in place by farmers, operating a process of “*re-localisation*” of food chains. Thanks to the territorial component, in their analysis Ilbery and Maye (2006) could demonstrate the complexity of LFS, which in their case is associated to the hybridisation between local and global, alternative and conventional food chains. In other words this perspective should help to unlock how local agricultural food production is embedded in the *place* (Gatrell et al., 2011), and better understanding the “inherent complexity of place” which may in the end affect the sustainability of the LFS (Duram and Oberholtzer, 2010).

This topic appears relevant especially in the case of periurban farming systems, which are characterised by issues on territorial proximity with urban areas. The geographical proximity is seen by farmers both as an opportunity and a constraint. By the one side the urbanisation causes conflicts and constraints in the agriculture sustainability, mainly because of the competition on resources and the undermine of social identity (Heimlich and Anderson, 2001); by the other side the geographical proximity is seen as an opportunity to renovate relationships between periurban farmers and urban dwellers, due to the multifunctional character that periurban agriculture may play (Zasada, 2011). According to several authors periurbanisation can be an opportunity to renovate the economy of agriculture for example through local food networks (Aubry and Chiffolleau, 2009).

The overall purpose of this study is to develop a methodology to perform a spatial network analysis in order to understand the main elements which affect the organization of local food networks between farmers, processors, and sellers of local farmers' products. Especially, our starting point are periurban farmers, who develop local food networks with the proximal urban area.

2. Material and methods

2.1. Case study and actors

The study is based on a territorial approach, where territory is both a tool for the selection of farmers and one of the factors that may influence the organization of food networks. The local area is defined in the periurban area of Pisa (Tuscany, Italy). The area is characterized by heterogeneous farming systems, mainly composed by horticultural (8%), winter cereal (26% on the total cereal oriented farms), livestock (16%) and olive oil (34%) productions (ISTAT, 2011). The case study is characterized by an ongoing

development of local food systems based on local food production (Di Iacovo, 2012; Marraccini *et al.*, 2013). A Regional Natural Park is located in the west side of the area, involving a part of the agricultural activity performed by farmers. The analysis is based on semi – structured interviews to farmers and to the commercial actors they are linked to: retailers, processors, cooperatives, intermediate and institutional actors. For the purpose of this study we have limited our analysis to livestock farmer, hence we analysed the interviews of 14 livestock producers, representing 80% of the total livestock units of the area (ISTAT, 2011). The food products of these farmers are meat and milk. Livestock producer’s local food chains have been also chosen in order to deeper understand the mismatch in the potential, actual and real food capacity of livestock farms in the area (Filippini *et al.*, 2014).

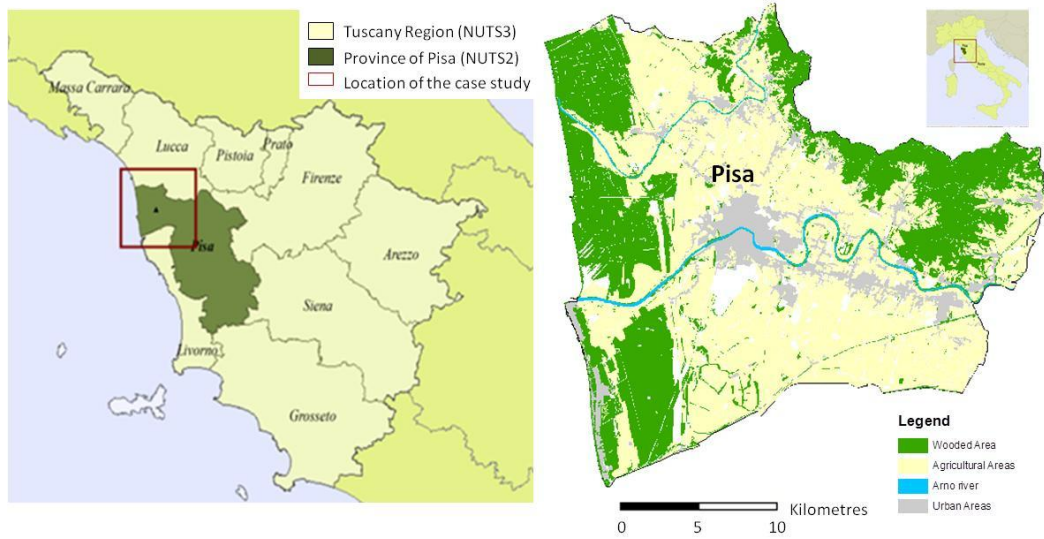


Figure 1 Location of the case study

Table 1 Principal information about livestock productions in the case study. LSU refers to livestock unit, UAA refers to Usable Agricultural Area

Main Product	Number of farms	LSU	UAA	Breeding
Meat beef	7	1161	1438	Limousine (Private label), Mucco Pisano (Private label), Chianina (IGP)
Milk beef	4	724	1146	Friesian Holstein
Meat sheep	4	422	587	Massese
Milk sheep	3	411	566	Massese

Processors and sellers were selected considering the interviews of the farmers: they are the commercial actors the farmers are firstly related to. For the purpose of this analysis 3 processors have been selected to be further analysed (Table 3).

Table 2 Principal information about the selected processors

Processor	Description	Origin	Quantity processed	Localisation
P1	Slaughterhouse and Butchery	Public consortium of farmers, butcheries, and the	Slaughterhouse: 5000 cows/year; Butchery: 50 cows/year	Province of Pisa

		abattoir		
P2	Cheese factory	Family	400-500 q milk/day	Province of Pisa
P3	Cheese factory	Family	50 q milk/day	Area Pisana

Finally, among all the sellers three types of sale (Table 3) were considered for the analysis; they have been selected because they all have in common the purpose of supporting local food production, but they have put in place a different strategy to involve farmers and so to organize the local food network. The sellers are:

- a grocery, individual enterprise, engaged in the promotion of local and/or organic production. (S1)
- a farmers market (FM), which project is managed by a farmers' union. (S2)
- a cooperative which project is a "mediated" direct sale. (S3)

Table 3 Main information about the sellers

Processor	Description	Origin
S1	Grocery	Private Individual initiative
S2	Union's FM	Union initiative, with farmers involvement
S3	Cooperative	Partnership between the cooperative and the municipality

2.2. Methodological pathway

The methodology has followed 3 steps (Fig.2). First of all we build up *Local Food Networks Typologies (LFNTs)*, by linking together the actors and the actions carried directly on the product in the local food chains: farmers (F), processors (P), distributors (D), retailers and other sellers (S). Considering the purpose of the study, we have not analyzed the consumers, but only the nodes of the food networks that allow to local farmers to make available their produce to local consumers. The typologies are thus macro-categories of local food networks, that enable us to group together farmers beyond the food produced and to better understand the different interactions of farmers with local food networks. In this analysis we have fixed a spatial limit for F and S nodes that to be chosen they need to be located in the periurban area, while the border of P and D can be at the regional level.

In the second step (Fig.2), the LFNTs have been spatialised, by connecting the farmers' location with processors and sellers' location through a first localisation on Google Earth based on the address and an import and processing under ArcMap. In this way we can have the information about the localization of the different functions operated by the actors (nodes), and so to calculate and interpret the potential role of proximity using the "Network Analysis" tool. In ArcGis the Network Analysis tool calculates the distances between two nodes considering the routes on the territory.

In the third step, the resulting model of the previous phases has been analysed combining other elements of the networks, organized in the "Network's Table". The farmers' Network Table (see appendix) sums the main information from the interviews regarding the commercial networks: the frequency of food provisions, the quantities, the prices, the quality, the constraints farmers need to face in order to organise a local food chain.

Finally, we have compared the farmers' networks with the Network's Table of the other actors in the food chain. The Network's Tables of the stakeholders contain information on food quantity, quality requirements, prices of sale to other food chain's actors and cost to buy from farmers, and the food chains' characteristics, such the constraints they face in meeting farmers and in selling locally the product. In this last step we performed a qualitative analysis, especially focused on the constraints of farmers in developing a certain network.

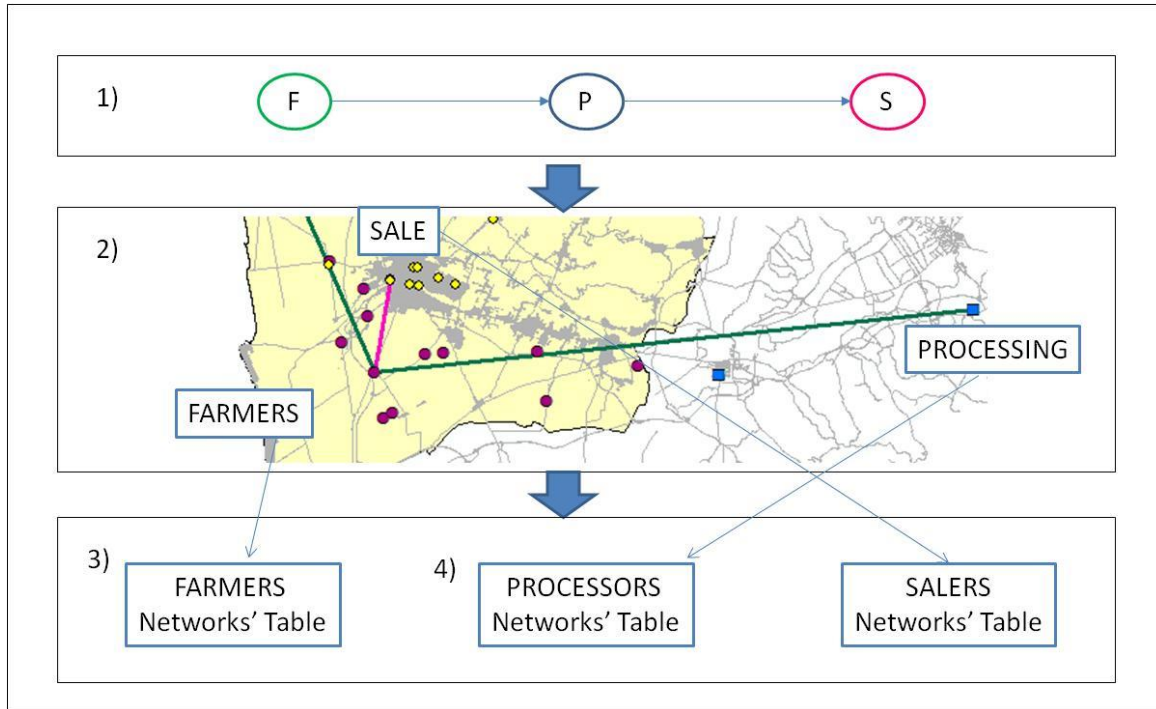


Fig.2 Methodological pathway for the network analysis

The constraints are defined both for farmers, processors and sellers (Tables 4 and 5).

Table 4 Farmers constraints perception

Constraint	Hypothesis	Specific Constraints	Acron.
Regulatory Constraints	Periurban farmers experience constraints linked to the organization of local food chains (for example direct sale, processing of product), but also from the fact to work in periurban area and from general agriculture regulatory	Processing rules	Reg
		Environmental rules	
		Employment rules	
Constraints link to urbanisation	The proximity to the urban centre is both an opportunity and a constraint, due to the inefficiencies of urban sprawl on territory	Constraints linked to transportation	Urb
		Influence on the production (land fragmentation, scarcity)	
Commercial networks' constraints	The possibility to establish local commercial networks is affected by external and internal conditions to the farm, such as the difficulty in	Payment of the products	Comm
		Need of specific knowledge	
		Lack of market	

	negotiating, the price, the requests from buyers, etc	Lack of spaces	
Socio-political constraints	The “periurbanity” imply new social conflicts, as well as conflicts link to the public policies.	Social conflicts with new residents	Sopo
		Bureaucracy	
		Lack of attention from policy makers	
Technical constraints	Difficulties affecting the farming practices, for which for example some products are not suitable	Land use	Prod
		Lack of yields	
		Need of producing specific marketable production	
		Environmental conditions	
		Quality requirements	
Internal constraints	Internal characteristic of the farm, doesn’t allow or facilitate farm in pursue a specific strategy	Availability of manpower	Int
		Availability of spaces for the sale or the processing	

Table 5 Constraints perceived by processors and sellers

Constraints	Hypothesis	Specific constraints	Acron.
Availability Quantity	Assessment of the real demand of food production from commercial actors	Seasonality	Seas
		Single product quantity	QtP
		Products diversification	Div
		Available farms	QtF
Price	Assessment of negotiation capacity of farmers and processors	Poor added value	Adv
		Price too low	PrLo
		Price too high	PrHi
Quality	Assessment if there are any limits in the quality of periurban farming’s products	Organic farming	Org
		Processed products	Proc
		Local products	Loc
		High quality products	HQP
Food Chain	Analysis of the chain beyond the farmer and the processor negotiation: how is it organize the food chain? are there limits that don’t depend on farmer and processors strategy?	Lack of a local food chain	LFC
		Lack of coordination in the FC	LCf
		Actors power issues	Pow
		Consumers demands	Cond
		Difficult agreements	Agree

3. Results

3.1. Types of Local Food Networks: heterogeneity of local food networks

Seven Types of Local Food Networks (LFNTs) result from the first step of analysis, showing a high degree of initiatives organised by farmers to maintain the products locally (Fig.3).

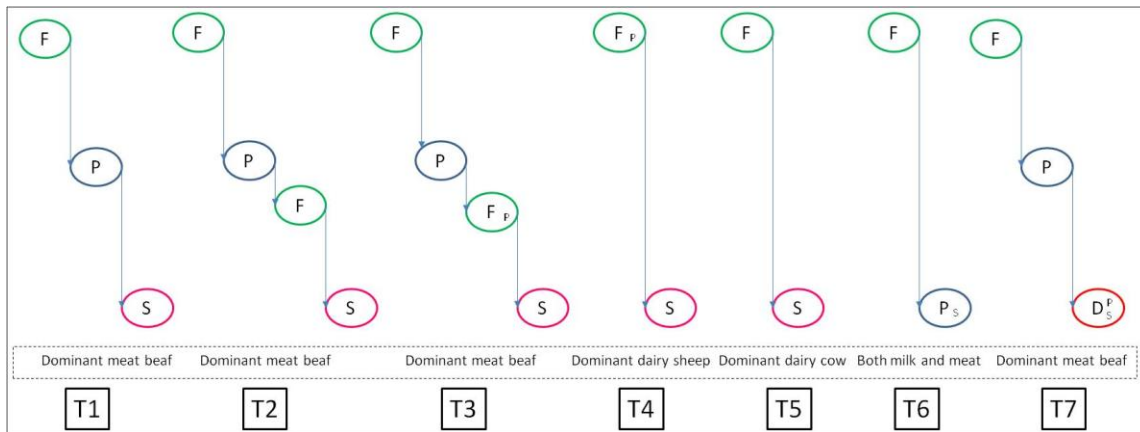


Figure 3 Types of Local Food Network. F refers to the farmers, P refers to the processor, S refers to the seller

In T1 farmers control directly the space of sale, but they need to do all the phases of processing outside the farm; thus the product goes directly from the processor to the seller. In T2 the product has a short passage in the farm before going in the space of sale. In T3, farms do the first phase of processing (eg. slaughtering) in the processor, while the second phase (e.g. butchery) is done in the farm, before it is sold. In T4, the processing is completely done in the farm, while in T5 there is no need for processing. As it is possible to notice, only one LFNT suits for both milk and meat (T6), while the other LFNTs are designated only for milk or meat production. Only in T7 farmers reach the distribution's actors; this depends on the action of an intermediate actor which purpose is to facilitate the negotiations between farmers and the supermarket. The analysis of LFNT show that 7 farmers put in place at least two LFNT; only 3 farmers out of 14 put in place only one LFNT both for meat and milk (T6), but they need to negotiate with different stakeholders for the two productions; 5 farmers selling only meat, rely only on one LFNT, but it is different for each of them.

This result shows that:

- from the point of view of farmers, speaking of local food networks means to organise at least 7 different links with processors, sellers and distributors. This result demonstrates a high degree of heterogeneity at territorial level.
- the networks are different for the production sold from farmers.

3.2. Spatial Network Analysis

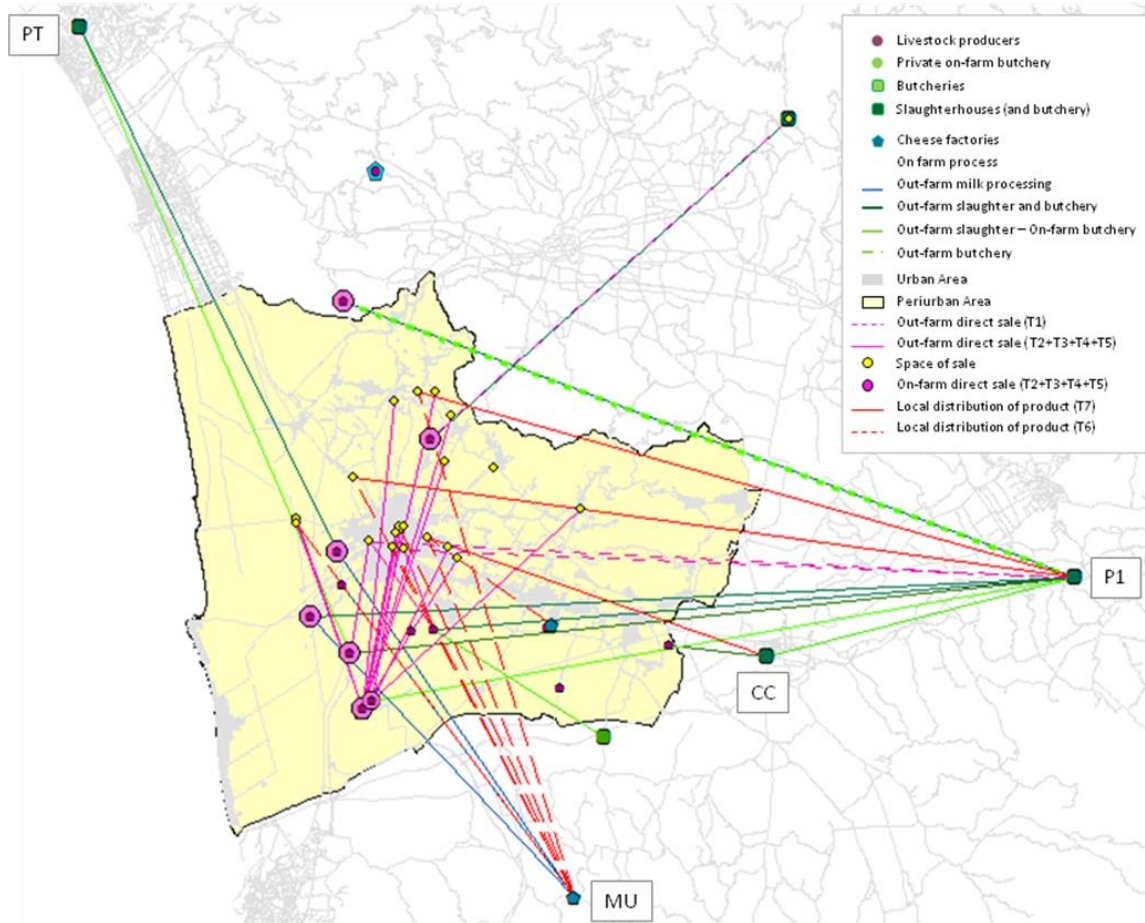


Figure 4 Spatialisation of LFS

Figure 4 shows that in order to provide food locally (red and rose lines) the primary produce needs to go outside the region (green and blue lines) in order to be processed. Moreover farmers combine different food networks, including different spatial dynamics. For example F2 has 3 different networks to sale the same production, an on-farm direct sale (T5), a sale to P2, and a sale to MU (T6) (Fig. 8). Especially according to the farmer this third one supports the on-farm direct sale, since the milk not sold daily can be transported and processed in the firm, avoiding the loss of profit. Moreover F1 combines the commercialisation of the milk with the sale of the meat through supermarket supported by the intermediate actor in T7.

Table 6 Distances of the F2 networks

Name	Total Length (km)	Type of food network
F2 – MU		T6
F2 – P2	27.3	T6
F2 – P1 – CC – D3	43.7 – 18 – 20.56	T7
P1 – S	22.63	T6
P1 – D3	22.88	T6
P1 – S3	23.46	T6

P1 – D1	26.98	T6
P1 – S	28.74	T6
P1- D2	32.44	T6

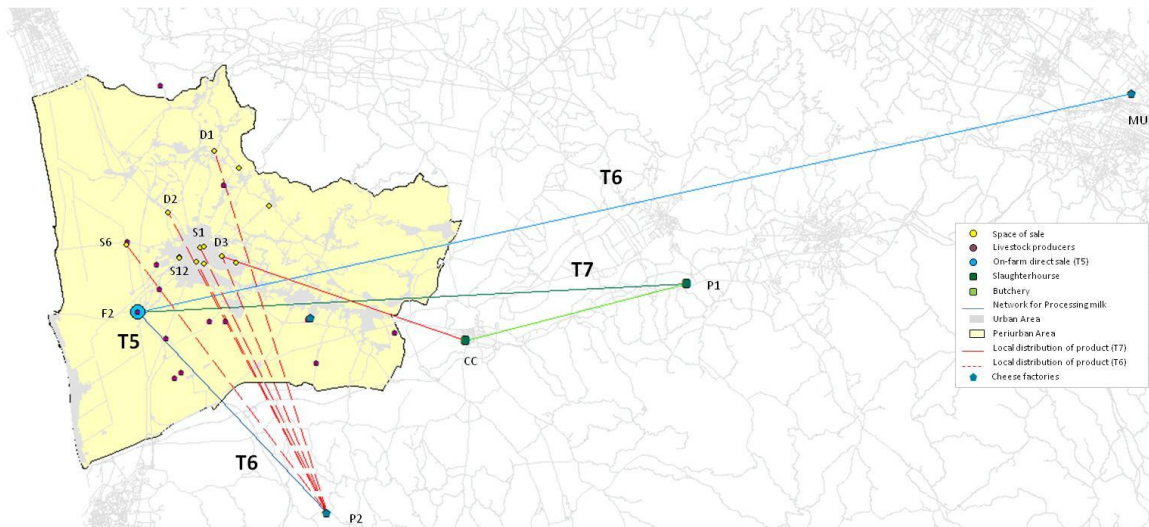


Figure 5 F2 Food networks. Pn°, MU, CC represents the processor; Sn° represents the different spaces of sale; Fn° represents the farmers; Dn° the different spaces of the distributors

F1 (Fig. 5, Table 7), organise the processing is divided in two steps: the first is done in the slaughterhouse, while the butchery is done in the farm, so the product comes back in the farm. (F1, T3); in the second one, the processing is done completely out of the farm; the killing of the animal in the slaughter, and the butchery is done in a specific place owned by the company who does also the distribution of the product (F1, T7). Moreover, the actors are different both for the processing and the sale of the meat.

Table 7 Distances of the F1 networks

Name	Total Length (km)	Type of food network
F1 – PT	36.81 (x2)	T3
F1 – S2	5,90	T3
F1 – P1 – CC – D3	42,44 – 18 – 20,56	T7

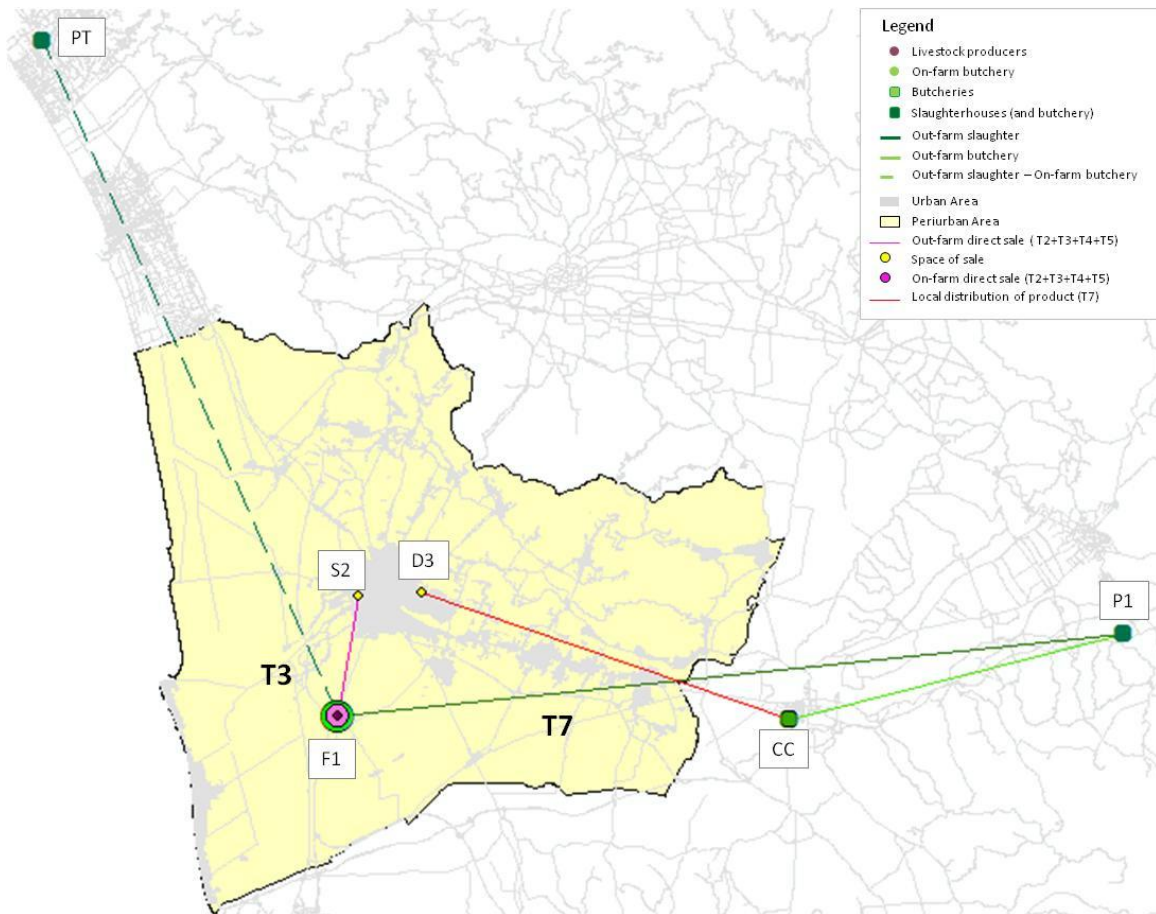


Fig. 6 shows also the centrality of certain actors as P1 the slaughterhouse and P2 a cheese factory. Moreover it shows that processors deal with different types of local food networks, marketing strategies and actors. This heterogeneity is linked also to the different quality's requirements and contracts they have to deal with.

3.3. Networks Tables analysis: constraints analysis

Among the data collected in the network tables, we show the results on the constraints analysis.

Constraints for farmers

Most of the farmers have experienced regulatory constraints. All the LFNTs have farmers concerned with regulatory constraints (data not shown). Especially for 50% of the sample's farmers, the constraints were related to regulations of processing of products (eg. butchers and cheese factories): the obstacle is related to the financial investment needed to adapt to the health regulations present, but also the difficulty in having the permission from the local authorities. For example F2, because of regulatory constraint

has to organise a conventional food chain (T6) for the milk not sold locally (T5); F11 because of the high cost of the on-farm butchery has to organise a T1.

Other rules are related to the presence of a Regional Natural Park: even though it allows to preserve the agricultural land use, it also imposes strict environmental or building rules, thus affecting the farms' diversification, for example in open direct sale (F5 in T2). This constraint is linked to a socio-political constraint, the conflicts between different public institutions: in fact there's a lack of dialogue with policy-makers, for example in establishing common rules for the on farm processing and the on farm direct sale. In general the conflict with public institution is perceived by almost 50% of the farmer and it includes also difficulty in bureaucracy.

Commercial constraints are also very important. Especially farmers in T3 and T1, claim for a difficulty in the negotiation in the local food chain, since they do not have a support: farmers have highlighted the difficulty in being paid by local commercial actors, especially restaurants, and small groceries (e.g. F8 in T3). On the contrary in T7, the unique LFNT which reach distribution, 3 out 4 farmers participate in a project for the valorisation of local breed, and they are supported by an intermediary actor. Such actor organise the supply for the supermarket and negotiate the price. In the interview farmers are satisfied by this network: even though the price is slightly lower than in the on-farm direct sale, the transactional costs seemed to be reduced. Moreover the organisation of the supply maintain a market power balance, which is not the case of conventional food chains where the farmer alone sells the product to the supermarket. For example F11 has decided to organise T1 and T2 to control the final sale of the product, after having suffered production and market rules from the supermarkets.

Commercial constraints are not perceived by farmers who have organised an on-farm direct sale. Consumers are very well supportive and adaptable. The urbanisation plays an important role since the proximity with urban dwellers is seen as an important fact in attracting them in the on-farm direct sale. Moreover for several farmers (e.g. F11, F3, F8) the sale in groceries, restaurants, farmers markets, is seen as an opportunity to be known, in order to attract customers in the farm, where they can get the maximum profit.

Nevertheless, urbanization is a very important constraint for farmers since it causes fragmentation of land, influencing the rotations decision, due to high cost of transport; moreover the presence of infrastructure affects the possibility pasture. The technical constraints are thus a consequence of urbanization process, and in the end it affects the effective possibility to supply local food system.

Constraints for processors

The analysis has revealed several constraints linked to quantity, quality, price of products expected by processors on periurban farming system, as well as several constraints on the organization of food chain.

The analysis revealed that the constraints more recognized by processors are linked to Availability and Food chain, both for milk and meat processors (Figure 10). Especially all the actors express the need of more farmers closely located, as well as the problem of seasonality but only for milk processor.

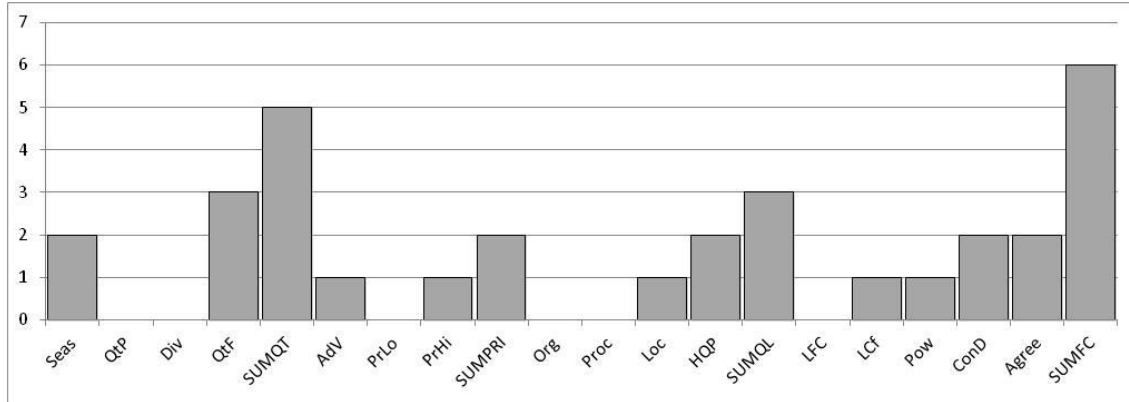


Figure 10 Frequency of constraints for processors. For acronymous see Table 5; SUMQT, indicates the sum of frequency for indicators on availability; SUMPRI, indicates the sum of frequency for for indicators on price; SUMQL, indicates the sum of frequency for for indicators on quality; SUMFC indicates the sum of frequency for for indicators on food chain.

In order to overcome the constraints of availability of farms, P2 has organized an international food chain in order to have sheep milk all over the year; moreover it has diversified the production in order to offer cheese made by cow, for example from F2. This last strategy has been adopted also from P3 which is provided of milk by the neighbour F13.

The availability of local farms is the unique constraint expressed by all the processors. For sure, the processors have as reference different level of locals. For all, the problem is the decrease of farms at regional level, but also the fact that traditionally the farms are far from their enterprises, and more farm in periurban area will be a benefit in terms of transportation's cost. While the first fact express the general crisis on farming activity in all the supply basins, the other refers to the fact that to have much more close farms would reduce the cost of transports and negotiations. The milk processors have both a supply basin in the province of Pisa (P3) or at regional level and international level (P2), but they also processed different amount of product (see Table 3), as well as they have different distribution's channels, local (P3) and regional/national/international (P2). Nevertheless they are both critic in the lack of "local" product, or in other words product from Pisa's farmers.

The slaughterhouse has observed a decrease of almost 70% of both private butchery and livestock producers in the last 15 years, which has lead to a change in the legal form, from a Consortium to a Limited Liability Company (LTD).

Food chain constraints are the more frequent constraints detected. Especially they linked to the consumers' expectations, especially from cheese processors which report an increasing preference of "soft" cheese, considered of less quality, and with a reduced price. Moreover actors claim for a more organized food chain. (P3) for example

expresses difficulty in agreement with supermarkets in the provision, which change a lot, and several constraints linked to the label: they put the label of Pisa and it has been considered as a concurrence to the IGP, which is connected to power issues. Organization of food chains mean also projects of local institutions for the support of local products, this has been especially expressed by P1 and P2, which have also promoted several food chains' projects. The first one with local institutions has participated in a *Progetto Integrato di Filiera*¹, which one of the action puts in place was the building of a shop exactly in the cheese's factory location, for the sale and thus the support of products from Tuscany with special focus on certified products and products from Pisa's Province; in the shop there is also the sale of various products, which have in common to be "local", in the meaning of "typical" of same place. The slaughterhouse has organized a project for the provision of local school canteen², but it detects difficulties in participating in public calls, that seems not designed for the specific support of local initiatives.

Constraints from sellers

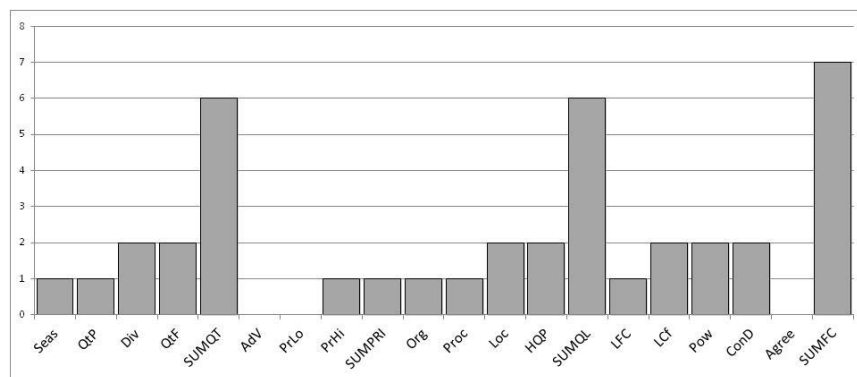


Figure 11 Frequency of constraints for sellers. For acronyms see Table 11; SUMQT, indicates the sum of frequency for indicators on availability; SUMPRI, indicates the sum of frequency for indicators on price; SUMQL, indicates the sum of frequency for indicators on quality; SUMFC indicates the sum of frequency for indicators on food chain.

The constraints analysis (Fig. 11) reveals that one of the most perceived constraints is connected to availability of farms. A part S3, the other sellers denounce by one side a difficulty in finding farms available to sell products, by the other side there are difficulties in negotiating with farms the furniture of product. This reflects a general lack in the coordination of the local food chains. As said by the actors, the strategy is to contact the farmers already involved in other food chains, and there is no way to know about the availability of new farmers. Farmers already involved in other local food chains, need to balance the different requests they have and so the furniture is irregular.

¹ http://www.pisa.coldiretti.it/filiera-toscana-piano-multifiliera-per-garantire-prodotti-tracciati-etrasparenti-due-mega-store-del-.aspx?KeyPub=GP_CD_PISA_HOME|CD_PISA_HOME&Cod_Oggetto=41434964&subskintype=Detail

² http://www.consorziomacelli.com/documenti/fattorie_tavola2009.pdf ;
<http://iltirreno.gelocal.it/pontedera/cronaca/2014/01/17/news/il-comune-dismette-la-parte-pubblica-del-servizio-1.8488264>

New farmers have to adapt to a certain standard quality not always certified by a label, and especially S3 question the effective productive quality of local product without a certification. By the other side organic productions are difficult to find. Nevertheless the sellers highlight the increasing demand of local production from urban consumers. Especially, few consumers look specifically for organic or certified productions, and the unique request are for more productions, or with more frequency.

In general FM shows less constraint with farmers, since there's an increasing demand of joining the markets, as well as an increasing demand from municipality to organize such markets in their places, as well as an increasing consumers' flow. According to the actor interviewed there's a problem of diversification, since most of the producers' sale horticulture.

4. Discussion and Conclusion

In this study a network analysis has been performed which aim is to integrate the territorial perspective of local food system, in the belief that place matters. The methodology has been applied on livestock productions analyzed at territorial scale. It can also be applied to other food chains, other territorial levels, and it can include different information on the organization of agro-food networks.

First of all, the borders definition of "local" is different for the different nodes and the different actors in the local food networks. According to the farmers to be "local" the production and the consumption should be located inside the periurban area, while the processing phase could be located in a wider buffer. This result comes from the fact that in the periurban area there is only one processor, a cheese factory, and all the others are located outside the production's area. Moreover the processors are not chosen because of the distance, but most of the time because of the services they provide (special attention to the butchery for example – F1) or because they participate in a special network. However, the distances represent a monetary and transaction cost that farmers need to face.

At the same time processors and sellers claim for a better knowledge of the farmers located in the area which can be included in their marketing strategies.

Secondly, the study has empirically demonstrated the high degree of heterogeneity which is linked to the organization of local food networks at territorial level (Ilbery and Maye, 2006). This spirit of initiative is both an opportunity and a constraint for the local food system: on the one side, it shows the entrepreneurship of farmers, which adapt to demand of local products; farmers are adapting to the new opportunities of urbanization, hybridizing the forms of organization of the local business networks but also by hybridizing different marketing actors (Filippini et al., 2016). On the other side, the analysis of commercial actors' network's table highlights how it is difficult to organize the offer of local produce. Farmers tend to organize networks with many different actors

in order to be known by costumers. The commercial actors thus are receiving small and irregular provision of food from farmers. This process may affect the sustainability of the profitability of small local commercial enterprises. In conclusion the meeting of food demand and food supply should not to be taken for granted (Raynolds, 2000) and an effort is needed to coordinate the individual initiatives, to better answer questions on territorial development and achieve sustainable development.

References

Follow the ERAE style (http://www.oxfordjournals.org/our_journals/erae/for_authors/)

Aubry, C., and Chiffolleau, Y. (2009). Le développement des circuits courts et l'agriculture péri urbaine: histoire, évolution en cours et questions actuelles. *Innovations Agronomiques* 5, 53–67
Chiffolleau, Y., and Touzard, J.-M. (2014). Understanding local agri-food systems through advice network analysis. *Agriculture and Human Values* 31: 19–32.

Crespo, J., Réquier-Desjardins, D., and Vicente, J. (2014). Why can collective action fail in Local Agri-food Systems? A social network analysis of cheese producers in Aculco, Mexico. *Food Policy* 46: 165–177.

Di Iacovo, F., Brunori, G., and Innocenti, S. (2013). Le strategie urbane: il piano del cibo. *Agriregionieuropa* 32: 9–16.

Duram, L., and Oberholtzer, L. (2010). A geographic approach to place and natural resource use in local food systems. *Renewable Agriculture and Food Systems* 25: 99–108.

Gatrell, J.D., Reid, N., and Ross, P. (2011). Local food systems, deserts, and maps: The spatial dynamics and policy implications of food geography. *Applied Geography* 31: 1195–1196.

Filippini, R., Marraccini, E., Lardon, S., and Bonari, E. (2014). Assessing food production capacity of farms in periurban areas. *Italian Journal of Agronomy* 9: 63–71.

Filippini, R., Marraccini E., Houdart ., Bonari E., Lardon S. (2016). Food Production for the City: Hybridization of Farmers' Strategies between Alternative and Conventional Food Chains. *Agroecology and Sustainable Food Systems*. Doi: 10.1080/21683565.2016.1223258

Heimlich, R., and Anderson, W. (2001). Development at the Urban Fringe and Beyond: Impacts on Agriculture and Rural. Economic Research Service, U.S. Department of Agriculture. Retrieved from: http://www.ers.usda.gov/media/536851/aer803_1_.pdf

ISTAT – Istituto nazionale di statistica (2011). 15° Censimento Generale della Popolazione e delle Abitazioni. Dati warehouse. Retrieved from: <http://dati-censimentopopolazione.istat.it/>

Kneafsey, M., Eyden-Wood, T., Bos, E., Sutton, G., Santini, F., y Paloma, S.G., Venn, L., Schmutz, U., Balázs, B., and Trenchard, L. (2013). Short Food Supply Chains and Local Food Systems in the EU: a state of play of their socio-economic characteristics. European Commission, Joint Research Centre, Institute for Prospective Technological Studies .Sevilla, Spain.

Ilbery, B., and Maye, D. (2006). Retailing local food in the Scottish–English borders: A supply chain perspective. *Geoforum* 37: 352–367.

Lockie, S., and Kitto, S. (2000). Beyond the Farm Gate: Production-Consumption Networks and Agri-Food Research. *Sociologia Ruralis* 40 : 3–19.

- Marraccini E, Lardon S, Loudiyi S, Giacché G, Bonari E. (2013). Durabilité de l'agriculture dans les territoires périurbains méditerranéens: Enjeux et projets agriurbains dans la région de Pise (Toscane, Italie). *Cahiers Agriculture* 22: 517-525.
- Murdoch, J. (2000). Networks—a new paradigm of rural development? *Journal of Rural Studies* 16: 407–419.
- Raynolds, L.T. (2004). The Globalization of Organic Agro-Food Networks. *World Development* 32: 725–743.
- Torre, A., and Rallet, A. (2005). Proximity and Localization. *Regional Studies* 39: 47–59.
- Wiskerke, J.S.C. (2009). On Places Lost and Places Regained: Reflections on the Alternative Food Geography and Sustainable Regional Development. *International Planning Studies* 14: 369–387.
- Wielinga, H.E. (2008). Networks with free actors. Encouraging sustainable innovations in animal husbandry by using the FAN approach. Wageningen UR.
- Zasada, I. (2011). Multifunctional peri-urban agriculture—A review of societal demands and the provision of goods and services by farming. *Land Use Policy* 28: 639–648.

Annex

Table 8 Farmers' Network Table. ONF refers to on-farm direct sale; GRO refers to grocery; REST refers to restaurants; ICE refers to ice-cream shop; SUP refers to supermarkets; PRO refers to processors; FM refers to farmers market; OUF refers to all other forms of out-farm sale.

Type of product (meat/milk)
Type of sale (ONF, GRO, REST, ICE, SUP, PRO, FM, OUF)
Name of buyer (sale)
% Product sold through the actor on the total
% Total product sold through LFS on the total
Price of sale
Quantity
Frequency of provision
Processing (out=1; ONF=2; no need=0)
Cost of the processing
Name of the processor
N° of quality labels
Name of the labels
Presence of intermediary actor (1=yes; 0=no)
Name of the intermediary actor
Participation to Project (1=yes; 0=no)
Name of the Project
Regulatory Constraints (1=yes; 0=no)
Internal Constraints (1=yes; 0=no)
Urbanisation constraints (1=yes; 0=no)
Technical constraints (1=yes; 0=no)
Commercial constraints (1=yes; 0=no)
Socio-political constraints (1=yes; 0=no)

Table 9 Processors' and Sellers Networks table

Produce
Quantities processed
Number of farmers from periurban area
Rate of farmers from periurban area
Price of buy
Gain from the processing (as subcontractors)
Frequency of provision from farmers
Differentiation of products
Commercial networks
Percentage of quantity sale for each commercial actor
Price of sale
Frequency of provision to market