Exploring the role of Farmers in Short Food Supply Chain: the case of Italy

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Abstract: The aim of this paper is to explore the role played by the farmers involved in Short Food Supply Chain in Italy paying attention to the social, economic and environmental dimension of sustainability. The research is based on a set of indicator related to structural, employment and economic aspects. Producers play an important role on a social, economic and environmental dimension. But at the same time there are several differences in SFSCs experiences. While the role played by social dimension is relevant in Farmers' Markets and in Multi Chain Farms, the environmental dimension is higher in Solidarity Purchasing Groups and in Farm Selling Directly, and the economic dimension plays a key role in each one of the typologies. Nevertheless, SFSCs are fundamental to promote and to achieve sustainability on a local level.

Keywords: Short Food Supply Chain, Sustainability, Farmers, Italy

Introduction

The aim of this paper is to explore the role played by the farmers involved in Short Food Supply Chains (SFSCs) in Italy paying attention to the social, economic and environmental aspects and to the differences between the markets.

Short Food Supply Chain can be defined as an agro-food supply chain with a small number of intermediaries between the producer and the consumer and/or a limited geographical distance between the two (Parker, 2005). In agricultural markets, SFSCs are therefore an alternative to traditional supply chains (Aubry et al., 2008), in which the principle players are wholesalers. Literature on the subject highlights that this is an approach to the agro-food supply chain based on new metrics: not mass production, but sustainable development (Morgan & Morley, 2002). Indeed, the so-called "Alternative Agro-Food Networks" are named after the refusal of food chain actors to adopt the main characteristics of traditional supply chains, such as extreme productivity, standardization and industrial organization (Higgings et al., 2008), while paying greater attention to other aspects, such as quality, origin and the "naturality" of agro-food production (Renting et al., 2003).

In Italy, SFSCs gained momentum in the 1980s, with further development towards the end of the 1990s while the greatest expansion started around the mid-2000s (Marino et al, 2012). There are now 890 Solidarity-Based Purchasing Groups in Italy, 270,497 farms sell directly to consumers, representing 26% of the total number of farms (in 2007, they were the 22.1% of all farms in Italy, and 5% more than in 2000), 1,367 Farmers' Markets, who over the past two years, have increased by 44%.

At regard, the paper focuses on producers involved in SFSCs, seeking an assessment of their sustainability in the Italian context. The general objective is to evaluate, basing on empirical data,

whether the Italian farms investigated can be considered sustainable on the three dimensions of sustainability (environmental, social and economic).

The concept of sustainability to which we refer is that of the World Commission on Environment and Development (1987), which takes into account the interrelation between environmental, social and economic issues. The short chain is able to touch all three aspects of sustainability because it is able to "reconnect" agriculture with consumers (Curry, 2002): socially, through dialogue and sharing between the parties involved; economically and environmentally, respectively through the management of agricultural resources aimed at obtaining profits and the maintenance of public goods.

Studies on the effect of SFSCs on producers have primarily looked at FMs, highlighting their economic, social and environmental implications.

From an environmental point of view, farms that adopt forms of SFSCs tend to develop more sustainable production methods, which have a positive impact on biodiversity, on the landscape and the natural resources of the territory (Battershill & Gilg, 1998; Cicatiello & Franco, 2012). The necessity to diversify production to meet consumers' demand for variety has pushed farmers towards more diverse farming practices, so that they do not specialize in one or two products but instead offer a wide range of products. This often means the rediscovery of traditional vegetables, ancient fruit cultivation and dairy products made from indigenous breeds. The reorganization of production systems can also cover the decision to adopt production methods with lower environmental impact, such as organic farming or integrated agriculture (Bullock, 2000). The short supply chain, being based on the relationship between producer and consumer at a local level, can greatly reduce the distance that food has to travel from where it is produced to where it is consumed, and, therefore, limit external negative factors linked to its transport, such as CO2 emissions, air pollution, traffic, accidents and noise pollution (DEFRA, 2005).

Looking at social reasons, local markets generate a net profit in terms of employment (Bullock, 2000). SFSCs represent an opportunity to develop the activity of young farmers and to integrate the income of pensioners who are dedicated to agriculture (Hilchey et al., 1995). Besides, the development of selling activities may involve the need to hire workers outside the family in order to cover the increased need for labor, creating further employment opportunities for the residents of rural areas, promoting in this way a virtuous circle which benefits all the components of the territory (Marino et al., 2013).

At local markets, relationships are easily made on a personal level and linked to this shared space (Lyson & Green, 1999; Hinrichs, 2000). These occasions represent an opportunity for sharing and exchanging information and opinions on production techniques, on the specific characteristics of a product and, more in general, on countryside knowledge (Renting et al., 2003). Following these considerations, we could interpret the spreading of new forms of supply chain even as a political tool, to back the wish of some public administrations to retain agriculture and farming in the areas surrounding towns instead of transforming previously farmed land into urban areas (Aubry et al., 2008).

Economically, producers taking part in SFSCs can make a significant profit (Brown, 2002). They have a direct input on price, which can be determined in a total autonomous way (Cicatiello & Franco, 2008). This allows farms to regain control over their decisions about what to produce (Hinrichs, 2000), and escape from the vicious circle typical of traditional markets. This also means that they can avoid the so-called squeeze on agriculture (Van der Ploeg, 2006), namely, the situation whereby a farmer is pressed on the one side by his suppliers and on the other by the wholesalers to whom he sells his products, so that he gradually looses his decision-making autonomy. Producers taking part in SFSCs have enhanced entrepreneurial skills in aspects such as

their relationships with customers, marketing and business self-confidence (Feenstra et al., 2003). A further economic advantage is the opportunity of gaining immediate financial benefit (Vaupel, 1989). Through SFSCs, producers can also make their produce available to market-goers during periods of the year when offer exceeds demand (Hardesty & Leff, 2009), while, at the same time, continuing to use traditional marketing channels. In this way, placing products without creating a surplus allows farmers to sell their produce for more than the price they would have received from a wholesaler, while consumers can pay less than the normal retail prices (Tropp, 2008).

This literature review of the influence of SFSCs over producers has highlighted many aspects relating to sustainability and this has determined the choice of variables and indicators we used in our analysis.

Methodology

The direct survey covered 226 producer[269], selected according to the territorial distribution and to the type of short chain (table 1) and was conducted through structured questionnaires, of which 203 were administered directly to the producers, while the rest was compiled electronically by users of the NRN INEA. The choice was also supported by consultation with experts.

Among the different types of chain, the Farmer's Markets (FMs) with well 137 surveyed producers represent the largest category, followed by Solidarity Purchasing Groups (SPGs) (37 producers) and by the category of Farm Selling Directly (FSD) (30 producers). For Box Scheme and (BS) and Community Supported Agriculture (CSA) was detected, instead, a definitely smaller number of farms (respectively 8 and 4 units). To these has been added a special category defined Multi Chain Farms (MCFs) (10 farms) which identifies producers participating indistinctly in more markets.

Table 1: Number of farmers considered for the analysis

Types of market	Cities						Total
	Lecce	Pisa	Roma	Torino	Trento	Other	
Box Scheme			6	1	1		8
Community Supported Agriculture			2		2		4
Farmers' Markets	26	6	68	20	15	2	137
Solidarity Purchasing Groups	2	8	18	3	4	2	37
Farm Selling Directly	5	6	9	2	2	6	30
Multi Chain Farms						10	10
Total	33	20	103	26	24	20	226

At a territorial level, producers were interviewed mainly in the markets of Rome (103 units), while in the lasting markets the number of detected producers is significantly lower and varies between a minimum value of 20 units recorded in Pisa and a maximum of 33 units found in Lecce. Well 45% of the surveyed farms adopts production methods with a low environmental impact and almost 40% of them includes in the cropping systems a significant share of surfaces in permanent meadows and pastures, while farms with surfaces falling in areas of ecological interest and those with wooded area have substantially less consistency within the panel (respectively 17% and 20%). The average age of the interviewed farmers is rather low (41 years old) and as much as 67% of the farms are led by young entrepreneurs, especially male. The average farm size is quite large (about 25 hectares) and more than half of the surveyed companies has a size of 17

[269] The survey was carried out within the framework of a project financed by the Italian Ministry of Agricultural and Forestry Policies, and coordinated by CURSA, the Inter-university Consortium for Socio-economic Research.

hectares. The farms with meadows and pastures have a larger size (52 hectares), while the extension of the farms with bearing stands at much lower values (7 hectares). The farm products are mainly represented by fruits and vegetables; other relevant products are processed fruit and vegetables and olive oil that are produced by about one-quarter of the farms, as well as diary. The zootechnical production plays, however, a decidedly minor role compared to plant crops. In contrast, the complementary activities to agriculture in the strict sense are quite developed among the surveyed farms. The sustainability analysis was executed comparing firstly the performance of the surveyed farms with the national ones in relation to the indicators used and then the differences between markets.

The research is based on a set of indicator related to structural, employment and economic aspects. This set of indicators, although it does not consider all the issues included in the definition of sustainability, aims to keep a combination of the three spheres of sustainability. According to UN DPSCD (1996), environmental sustainability is the capacity to keep the quality and the reproducibility of natural resources. Social sustainability is given by the capacity to ensure human comfort equally distributed (in relation to class and gender). Finally, economic sustainability is measured by the capacity to generate an income and employment to support the population.

Environmental sustainability takes into account the way farmland is cultivated, the farmland falling in protected area and the distance form city center of gravity. The indicators used to measure social sustainability of SFSCs are focused on employment, in particular they consider the number of young employees, female workers and entrepreneurs, family workers, employees with disabilities and pensioners. Economic sustainability is given by some indicators which refer to standard output[270] (standard output vegetables, standard output olive trees and grapevine, standard output bearing etc.), multiplied by the use of farmland. The indicators chosen are those most used in studies on sustainability, and were selected carefully and with reference to the most frequently mentioned examples in literature on SFSCs and with regard to their environmental, social and economic impact (Battershill & Gilg, 1998; Ilbery & Maye, 2005; DEFRA, 2005; Aubry et al., 2008; Marino et al., 2013). They are listed in Table 2.

[270] Standard output is the economic criterion on which the European classification of farms is based, this classification is known as Community typology for farms. The purpose of the Community typology is to provide a classification scheme that permits to analyze the situation of the farms within the Community with regard to economic criteria and to have a comparison between farms belonging to different classes and between the economic results achieved over time and in different Member States and their regions.

Table 2: Sustainability Indicators

Dimensions of sustainability	Indicators	Description
Environmental dimension	EN_1	Diversified farm land[271]
	EN_2	Farm land cultivated with organic production method (hectares)
	EN_3	Farm land falling in protected area (hectares)
	EN_4	Farm land invested in meadows and pastures (hectares)
	EN_5	Farm land planted to forest (hectares)
	EN_6	Distance from the city center of gravity (kilometers)
Social dimension	SO_1	WU/UAA ratio
	SO_2	Total number of employees
	SO_3	Number of farmers and young employees
	SO_4	Number of female farmers
	SO_5	Number of family employees
	SO_6	Number of female employees
	SO_7	Number of employees with disabilities
	SO_8	Number of employed pensioners
Economic dimension	EC_1	Standard Output Cereals (value in €)
	EC_2	Standard Output Vegetables (value in €)
	EC_3	Standard Output Olive trees/Grapevine (value in €)
	EC_4	Standard Output Bearing (value in €)
	EC_5	Standard Output Meadows/Pastures (value in €)
	EC_6	Standard Output Cattle (value in €)
	EC_7	Standard Output Sheep (value in €)
	EC_8	Standard Output Poultry (value in €)

The methodology made use of ANOVA and MANOVA models/CVA. The Analysis of Variance (ANOVA) is a statistical procedure of inferential type that aims to evaluate the differences between two or more groups by comparing the variability within groups (Variance Within) with the external variability or between groups (Variance Between).

From a formal point of view, the formula is based on the decomposition of the total variance:

$$[1] \qquad n\,\sigma 2T = n \sum (x - \mu)2 = n \sum [(x - \mu x) + (\mu x - \mu)]\,2 = n\,[\sum (x - \mu x)\,2 + \sum (\mu x - \mu)\,2]$$

$$\mathrm{Var}\,(T) = \mathrm{Var}\,(W) + \mathrm{Var}\,(B)$$

where$\sigma 2T$ is the total variance, μ and μx are in order the overall average and the average of each group and $\sum (x - \mu x)(\mu x - \mu) = 0$ is the covariance.

The analysis is based on a statistic of F-type to assess the significance of differences between the mean values of two or more samples. The basic hypothesis is that the samples are normally distributed and have similar variances. Significant violations of these assumptions require the use of non-parametric tests, such as the Kruskal-Wallis employed in the analysis of qualitative ordinal

[271] Crop systems diversification has been calculated by applying to the UAA the index of Eveness that represents a normalized measure of the Shannon index and expresses the degree of diversity of a set of elements of which are known the relative abundances, that is the part occupied by each element within the whole, and assumes unitary value in the case of perfect equidistribution (all elements represent the same fraction of the whole) and a null value in the case where only one element dominates the entire set.

(time intervals) variables which relates to the estimation of the differences between medians. The estimation of significance is reported both at the global level (Wilks and Pillai test, to assess the probability that at least two groups have significantly different averages) and at the level of comparison between individual pairs of groups (Hotelling matrix).

In the study at issue, the ANOVA was used mainly to evaluate differences within groups or between the specific variables of each group, while to evaluate differences between groups the multivariate version (MANOVA) was used investigating the relations between variables and groups: the scatter-plot CVA (Canonical Variable Analysis) is used to represent the elements of each group on the Main Components plane, highlighting the associations between the distribution of the groups in the space and the orientation of the variables with regard to the main axes.

In this way, it was possible to explain the differences observed between groups in MANOVA analysis highlighting the correlations with the most important variables according to the weight (cumulative variance) of the axis, ignoring the non significant associations. To avoid that the analysis may suffer the non-uniform distribution of the respondents, the less representative chains in terms of farms, such as the types Box Scheme and CSA, have been merged into a single category BOX-CSA and this allowed to increase the statistical significance of the elaborations. The comparison between the two levels of analysis (multivariate and group level) then offered inspiration and foundation for explaining the producers' participatory process on short chain according to the examined dimensions (environmental, social and economic).

Farmers and sustainability

A comparison with the national scene

A first very important fact is that the indicators used for the analysis of sustainability record higher values for the surveyed farms compared to the same values that were recorded for the national farms[272].

From the environmental point of view, the value of the index of evenness (equal to 0.5) highlights for the surveyed farms a good level of crop diversification: about 75% of the areas are affected by at least three crops (against the 28 % of the national data) and this has as a result a lesser use of the monoculture practice and probably an improvement of the overall biodiversity. The surfaces planted with organic production methods have an influence in terms of UAA in the measure of 40%, a value well above the national average (9%), probably determined by consumers' demand of short supply chains that focus on quality products, and is looking with increasing interest at the principles of organic and ecological farming. The areas planted with permanent meadows and pastures are of even higher consistency in the farm system (67% of the total), a higher data than the national one (27%), confirming the effectiveness in this circumstance of agri-environmental policies related to the conservation of semi-natural areas in the territories where the surveyed farms are located. The forest areas have, however, a lower incidence in the panel (29% of the total), but still significant compared to the national scene (18%). Similarly, the farmland falling in protected areas are placed on even lower thresholds (13% of UAA), but anyway always greater than the national ones (8.6%): this figure, although favored by the spread of protected areas in the bands of some suburban cities, indicates a positive impact on the relationship between agricultural activity and environmental protection, considering the fact that the persistence of agricultural production processes is positive for the environment and the biodiversity in these areas. The farms are sited near to the major markets: the average distance from the market is about 25 km

[272] The information related to the national farms are deduced from the 6th General Census of Italian Agriculture by ISTAT (2010).

and this highlights the positive influence of short chain on reducing *food miles* and therefore emissions of carbon dioxide. This confirms, therefore, a framework in which farms that join forms of SFSCs tend to develop more environmentally sustainable techniques, which have a positive impact on biodiversity, landscape and natural resources of the land, in this sense, the SFSCs represents an opportunity to reduce the negative externalities of agriculture.

In terms of social sustainability, in the surveyed farms work, on average, 6 units, including 2 family members and 2 female workers. WU/UAA ratio shows rather low values, due to the high incidence in the production system of labor-intensive crops, such as fruits and vegetables, as well as complementary activities, in particular those of transformation, which absorb labor. As part of the labor force, family workers and women affect the extent of 34% and 35%. The share of young workers even if it falls on lower thresholds (25% of the total) appears, in any case, quite relevant, while the percentage of disabled workers and pensioners is rather marginal. Compared to the structure of employment in Italian companies, however, a particularly widespread employment of women among the business realities that attend the SFSCs is not shown. The presence of young people, traditionally fairly rare in the national agricultural sector, seems instead more widespread here. These data seem then to confirm the innovative nature of these forms of marketing that are chosen and carried out mostly by farmers of new generation. The short chain thus offers good opportunities for the development of young entrepreneurs' activities and involves the need to hire people outside the family to cover the increased need for labor, creating more employment opportunities for residents of rural areas. Minor, however, is the capacity of the SFSCs to ensure income supplements to pensioners who are dedicated to agriculture and employment opportunities for the weaker segments of the workforce, such as people with disabilities and this limits definitely the social impact of these experiences of SFSCs on the employment of the weak categories of the population.

From the economic sustainability point of view, the values of the standard outputs appear on average quite higher in the case of products ready for end use, such as vegetables and fruit, as well as for olive oil and wine, indicating that the farms in question are efficient in technical-economic terms.

The comparison between the markets

With regard to the comparison between the chains, the analysis suggests a substantially varied situation that changes according to the various aspects of sustainability.

Table 3 shows the synthetic results of the investigated farms involved in SFSCs. The descriptive statistics highlight a rather heterogeneous context of sustainability within the panel.

Table 3: Sustainability indicators' values (descriptive statistics)

Indicator	Description	Mean	Median	Standard dev.	Coefficient of variation
EN_1	Diversified farm land	0,55	0,65	0,39	0,70
EN_2	Farm land cultivated with organic production method (hectares)	23,06	0,00	57,93	2,51
EN_3	Farm land falling in protected area (hectares)	6,03	0,00	27,16	4,50
EN_4	Farm land invested in meadows and pastures (hectares)	13,40	0,00	72,62	5,42
EN_5	Farm land planted to forest (hectares)	5,77	0,00	9,14	1,58
EN_6	Distance from the city center of gravity (kilometers)	24,79	14,50	30,33	1,22
SO_1	WU/UAA ratio	0,43	0,23	2,79	6,44
SO_2	Total number of employees	6,00	3,00	14,75	2,46
SO_3	Number of farmers and young employees	2,00	1,00	3,47	1,74
SO_4	Number of female farmers	0,54	1,00	0,49	0,90
SO_5	Number of family employees	2,00	2,00	1,84	0,92
SO_6	Number of female employees	1,54	1,00	9,49	6,16
SO_7	Number of employees with disabilities	0,08	0,00	0,95	11,20
SO_8	Number of employed pensioners	0,14	0,00	0,63	4,63
EC_1	Standard Output Cereals (value in €)	6.695,15	0,00	28.024,26	4,19
EC_2	Standard Output Vegetables (value in €)	144.850,61	8.567,33	293.743,94	2,03
EC_3	Standard Output Olive trees/Grapevine (value in €)	31.387,01	0,00	61.330,42	1,95
EC_4	Standard Output Bearing (value in €)	35.154,58	0,00	83.075,96	2,36
EC_5	Standard Output Meadows/Pastures (value in €)	10.067,97	0,00	54.446,04	5,41
EC_6	Standard Output Cattle (value in €)	17.636,72	0,00	54.810,78	3,11
EC_7	Standard Output Sheep (value in €)	5.782,49	0,00	38.760,42	6,70
EC_8	Standard Output Poultry (value in €)	1.842,31	0,00	14.026,25	7,61

In environmental terms, first of all, there's a clearly condition of high variability between almost all the surveyed markets (table 4): the markets (except BOX-CSA) are well characterized and have averages that are significantly different from each other.

Table 4: Indicators of environmental sustainability

a) Mean Values

	EN_ 1_Diversified farm land	EN_2_Farm land cultivated with organic production method	EN_3_Farm land falling in protected area	EN_4_Farm land invested in meadows and pastures	EN_5_Farm land planted to forest	EN_6_Distance from the city center of gravity
Farmers' Markets	0,45	12,92	3,64	13,83	1,27	32
Farm Selling Directly	0,56	26,05	17,78	27,45	3,17	21
Solidarity Purchasing Groups	0,58	28,99	1,70	23,96	4,41	28
Box Scheme and Community Supported Agriculture	0,42	22,13	2,34	25,40	3,84	22
Multi Chain Farms	0,51	12,27	21,10	42,96	12,30	12

b) Values of significance (Hotelling's p values)

	Farmers' Markets	Farm Selling Directly	Solidarity Purchasing Groups	Box Scheme and Community Supported Agriculture	Multi Chain Farms
Farmers' Markets		0,0657	0,0352	0,6906	0,0002
Farm Selling Directly	0,0657		0,0122	0,4272	0,0479
Solidarity Purchasing Groups	0,0352	0,0122		0,8319	0,0042
Box Scheme and Community Supported Agriculture	0,6906	0,4272	0,8319		0,1468
Multi Chain Farms	0,0002	0,0479	0,0042	0,1468	

Level of significance ($\alpha \leq 0,05$)

The group of FMs producers is on average correlated with the variable referred to the distance from outlet markets, so that a greater ability of this typology to attract farms which are more distant from the center of the market may be assumed. Among the farms with the more extended biological surface some elements of the SPGs group stand out, while the farms with the greatest crop extension falling in protected areas are included in the types FSD and MCFs, with the latter that also includes some farms with areas of meadows and pastures and woods. The indicator EN_1 doesn't characterize any category. Among the supply chains some variability is shown in the groups FMS and SPGs between the variables EN_6 and the variables EN_1, EN_3, EN_4, EN_5, so it is to suppose that the farms which are more distant from the markets are characterized by a higher environmental value compared to those located in the immediate proximity. Regarding social sustainability, the data show some heterogeneity between the different types of supply chains (table 5). FSD categories and FMs have average values that are significantly different from each other in relation to the variables SO_2 and SO_6, while the farms of type FSD and SPGs show differences related to the variable SO_3 that refers to the consistency of farmers and young employees and the variable SO_1 (UAA/WU ratio).

Table 5: Indicators of social sustainability

a) Mean Values

	SO_1_ WU/UAA ratio	SO_2_ Total number of employees	SO_3_ Number of farmers and young employees	SO_4_ Number of female farmers	SO_5_ Number of family employees	SO_6_ Number of female employees	SO_7_ Number of employees with disabilities	SO_8_ Number of employed pensioners
Farmers' Markets	0,5	6,2	1,2	0,23	2,3	2,5	0,3	0,0
Farm Selling Directly	2,1	9,3	2,8	0,30	2,4	2,2	0,4	0,7
Solidarity Purchasing Groups	0,5	4,9	1,7	0,22	1,9	1,3	0,2	0,1
Box Scheme and Community Supported Agriculture	0,3	4,3	0,9	0,25	2,0	0,9	0,0	0,3
Multi Chain Farms	0,2	1,8	0,5	0,30	1,3	0,7	0,1	0,0

b) Values of significance (Hotelling's p values)

	Farmers' Markets	Farm Selling Directly	Solidarity Purchasing Groups	Box Scheme and Community Supported Agriculture	Multi Chain Farms
Farmers' Markets		0,0005	0,8345	0,8440	0,7094
Farm Selling Directly			0,0252	0,1897	0,0654
Solidarity Purchasing Groups				0,9858	0,9381
Box Scheme and Community Supported Agriculture					0,9708
Multi Chain Farms					

Level of significance ($\alpha \leq 0,05$)

Farm Selling Directly are distinguished by the highest number of employees who work at the farm, as well as by a greater intensity of work in relation to the farmland. The FMs have a higher incidence of employed women. In the SPGs markets there is a greater involvement of young employees. Within the SPGs, BOX-CSA and MCFs markets there are significant differences between the variable SO_4 which has higher average values and the variables SO_7 and SO_8.

In terms of economic sustainability, the differences between the markets are rather small and only the group MCFs shows mean values that are significantly different from the groups FMs and SPGs (table 6).

Table 6: Indicators of economic sustainability

a) Mean Values

	EC_1_Standard Output Cereals	EC_2_ Standard Output Vegetables	EC_3_ Standard Output Olive trees/Grapevine	EC_4_ Standard Output Bearing	EC_5_Standard Output Meadows/Pastures	EC_6_ Standard Output Cattle	EC_7_ Standard Output Sheep	EC_8_ Standard Output Poultry
Multi Chain Farms	10.196	176.228	82.317	110.913	7.904	4.518	21.967	300
Box Scheme and Community Supported Agriculture	5.308	32.368	7.617	33.709	25.395	28.073	0	1.126
Farmers' Markets	7.117	92.214	20.206	20.002	10.961	12.446	10.826	3.025
Solidarity Purchasing Groups	9.567	39.783	21.949	18.597	19.450	38.456	3.557	587
Farm Selling Directly	19.635	61.040	18.294	22.927	29.465	22.297	19.993	296

b) Values of significance (Hotelling's p values)

	Farmers' Markets	Farm Selling Directly	Solidarity Purchasing Groups	Box Scheme and Community Supported Agriculture	Multi Chain Farms
Farmers' Markets		0,5737	0,4628	0,8513	0,0059
Farm Selling Directly			0,5365	0,8266	0,0948
Solidarity Purchasing Groups				0,9948	0,0250
Box Scheme and Community Supported Agriculture					0,2794
Multi Chain Farms					

Level of significance ($\alpha \leq 0,05$)

The group FMs is, in any case, the most coherent according to the adopted metric. The group MCFs associates, however, higher standard production values than the other groups in relation to vegetable and fruit crops and with regard to olive and wine production. The FMs and SPGs groups have, however, production values that are on average higher for zootechnical production. Within the supply chains, in the FMs group significant variations are recorded between the variable EC_2 with higher values and the lasting variables, while in SPGs, there are differences between the indicators related to livestock: the variable EC_6 with a lower average differs from EC_8.

Conclusions

The analysis shows that within the national agricultural context farmers involved in SFSCs achieve better results in relation to sustainability. Farmers who attend SFSCs play an important role on a social, economic and environmental dimension because the short chain is able to strengthen all three aspects of sustainability. But at the same time there are several differences in SFSCs experiences. While the role played by social dimension is relevant in Farmers' markets and in Multi Chain Farms experiences, the environmental dimension is higher in Solidarity-Based Purchasing Groups and in Farm Selling Directly, and the economic dimension – particularly at farm level – plays a key role in each one of the typologies. In particular, SPGs producers show a clear preference for almost all dimensions of sustainability, with special attention to the consistency of the areas cultivated with organic production method, the intensity of work, the pres-

ence of young farmers and employees, revenues from zootechnical productions. The FMs farms are characterized by the rate of family workers and, to a lesser extent, by a slight economic vitality, as shown by the revenues from zootechnical productions. Farms with direct sales pay more attention to the environmental aspects related to the consistence of the surfaces falling within protected areas and to employment. MCFs farms are characterized, from an environmental point of view, by the presence of surfaces falling in protected areas, as well as by the incidence of meadows and pastures and woods; from an economic point these farms stand out for the values of the fruit and vegetable production and for those of oil and wine. Nevertheless, SFSCs are fundamental to promote and to achieve sustainability on a local level.

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