The supply chains of organic products: an empirical analysis of the processing sector in six EU Mediterranean regions

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Abstract

The paper analyses the characteristics of the processing sector of organic products and the relationships with agriculture and retailing sector in six EU Nuts II regions: Lombardy and Tuscany for Italy, Rhone-Alpes and Paca for France, Catalunya and Murcia for Spain. The choice of these regions is due to the fact that the analysis is linked to an European project concerning cohesion among Mediterranean countries. The purposes are to analyse the processing sector of organic products in terms of firms capabilities to perform a quality management strategy and to analyse the vertical coordination in the organic supply chains. The data were collected by an *ad hoc* questionnaire. The survey carried out was based on a sample of 304 firms stratified on the basis of the six regions involved in the study. The analysis revealed that a relevant aspect for the processing firms of organic products concerns the guaranteeing of safety and quality levels for the products, according to the economic framework emerging from the literature. The instruments to implement the quality management are based on the adoption of specific production regulations and quality controls. The premium price most frequently applied by processors ranges from 10% to 40% and similar values are revealed for retailers. The diffusion of supply contracts permits the vertical coordination between agriculture and processing firms in the organic supply chains. The main trade channels for the processing firms are represented by specialized shops in organic products, direct sales and supermarkets.

Keywords

organic products, processing and retailing, food quality, EU regions

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1. Introduction

Over the last decade, growing interest in organic products can be observed in the economic literature concerning food quality and safety (Bonti-Ankomah and Yiridoe, 2006). Although many empirical economic analyses have been carried out on organic farming and on consumer behaviour, the same attention has not been paid to the processing sectors and the relative retailing coordination within the organic supply chains.

The present paper analyses the characteristics of the processing sector of organic products and the relationships with agriculture and retailing sector in six EU Nuts II regions: Lombardy and Tuscany for Italy, Rhone-Alpes and Paca for France, Catalunya and Murcia for Spain. The choice of these regions and countries is due to the fact that the analysis is linked to an European project (Medocc–Interreg IIIb) concerning cohesion among Mediterranean countries. On the base of Eurostat data, in 2003, 53% of the UE-15 organic operators was concentrated in the three analysed countries (France, Italy and Spain) (Rohner-Thielen, 2005), but over the 2000-2004 period the number of organic farmers in these countries decreased, whereas the number of organic processors increased by 30%.

The purposes of the paper are to analyse the processing sector of organic products in terms of firms capabilities to perform a quality management strategy and to analyse the vertical coordination in the organic supply chains. The data were collected by an *ad hoc* questionnaire.

The paper is organised as follows: the economic issues of organic products quality and safety are examined in section 2; the survey conducted and the methodological issues are examined in section 3; the results are analysed in section 4 and the concluding remarks are set down in section 5.

2. Economic issues of organic products quality and safety

The EU political framework for organic products has shown some relevant changes over the last years, with health and quality attributes placed side by side with environmental issues. In the *European Action Plan for Organic Food and Farming* (EAP) (Commission of the European Communities, 2004) the organic farming is viewed as a sector producing public goods that are “primarily environmental benefit but also public health”; at the same time, according to the consumer perceptions, “the motive for consumers to buy organic products is linked to health and taste”. With the aim of grant the policy actions outlined in the EAP, at the end of year 2005, the Commission have presented a Regulation proposal on *organic production and labelling of organic products* (Commission of the European Communities, 2005) as a revision of the Council Regulation n. 2092/91 on organic production of agricultural products. The proposal underline that “farming shall aim at producing products of high quality instead of maximising production”.

At international level the link between environmental issues and quality and safety attributes are underlined in the organic products principles sanctioned by the International federation of organic agriculture movements (IFOAM, 2005): “organic agriculture is intended to produce high quality, nutritious food that contributes to preventive health care and well-being”.

On the other side, over the last years the economic literature about quality and safety attributes of organic products has been receiving a growing interest. With regard to the consumers’ concerns and in line with the EAP document, a number of studies underlines that safety, quality and health play the most important role in the consumers preferences about organic foods (Bonti-Ankomah and Yiridoe, 2006). Moreover, in the economic literature many analyses pointed out a relevant consumer willingness to pay a premium price for organic products (Canavari *et al*., 2002).

In this context, considering that consumers choices are related to the perception about quality and safety attributes, in the processing sector the firms are leaded to develop appropriate strategies to ensure and communicate such characteristics.

Therefore, in order to achieve a premium price, firms strategy for organic products should be based on quality management, certification system, labelling and brand image. Such instruments could involve process control, inspection, testing and identity preservation (Antle, 2001).

For organic products, typically considered as credence good (Nelson, 1970; Darby and Karni, 1973), quality strategies help to transform the credence characteristic into search attribute (Bonti-Ankomah and Yiridoe, 2006), leading to a reduction of asymmetric information level.

As a consequence, the competitive strategies based on quality management could involve the vertical relationships introducing contracts, agreements and other instruments of vertical coordination.

Therefore, the analysis focus on the strategies adopted by the processing firms of the sample in terms of quality and safety requirements and premium price achieved, considering the relation between processors and producers and between processors and retailers within the organic chain in the six EU Nuts II Mediterranean regions.

3. Methodological and empirical issues

To analyse the supply chains of the organic products in the six Mediterranean Regions we carried out a sampling survey during the winter and spring 2005. We created an *ad hoc* questionnaire subdivided in the following parts:

- general information of the firms,
- production features and quality management,
- raw materials supplying,
- commercial channels.

The most of the demands was in multiple choice format even if in each part there was a possibility for open answers to improve the understanding of that section (Kalton, 1983).

The survey carried out was based on a sample of 304 firms stratified on the basis of the six regions involved in the study. Each regions therefore identified approximately 50 units. During the sampling stage, the main objective was to set up sub-sample representative of the respective region even if this has yielded a quite unhomogeneous total sample.

With the aim to make a focus on processing firms and at the same time analyse the vertical coordination with the retailing sector, the sample was subdivided in two parts: 67% corresponded to processing firms with the remaining 33% being retailers. For what that concern retailers, 92% of them are shops specialized in organic product, while 8% is represented to modern grocery retailers (supermarkets and hypermarkets).

Due to the different characteristics of organic products supply chain between the six regions involved, the regional sub-samples were stratified, as far as possible, to be representative of the existing structure. In table 1 we report the sampling scheme.

Tab. 1 - Number of processing and retailers firm in the sample

Regions	processor	retailers
Catalunya	29	22
Lombardy	38	12
Murcia	39	10
Paca	26	25
Rhone-Alpes	37	16
Tuscany	35	15
Total	204	100

Source: our survey

However, it is important to underline that the division between processing and retailing sector is often not so clear in the organic products chains, consequently the sample of processing firms comprises a variety of situations including production, processing and commercialisation activities all in the same firm. This characteristic is more evident in regions like Tuscany and Murcia and in this case the activity which appeared to dominate was the one chosen.

About processing firms, of the total sample, 83% of them belongs to food sector, and the other are firms that process aromatic and medicinal organic plants.

Despite the objective of making the regional samples as homogenous as possible, from a quantitative and qualitative point of view, the different nature of the activities and, sometime, the refusal to answer to questionnaire, produced some divergences among the six sub-samples considered:

- Catalunya generated a sample mainly characterised by animal productions, such as meat, dairy products, eggs and honey;
- in Lombardy, following the existing structure, were taken into consideration firms processing bread, dairy products, pasta, fruit and vegetables, meat, oil wine and so on, were the first three sector represent more than 50% of total;

– in Murcia the majority of companies belong to the fruit and vegetable sector and approximately 75% of them follow, as above mentioned, at the same time, different activities;
– in the sample of Paca (Provence-Alpes-Côte d'Azur) region there is an equal number of processing and retailing firms even if the sector subdivision exhibits considerable differentiation;
– the Rhone-Alpes region is characterized by the presence of about 33% of activities linked to aromatic and medicinal organic plants;
– the data relative to Tuscany displays a high quota of agritourist farms, that integrate the various phases, from production to commercialisation.

4. Results

4.1 Organic processing sector: quality strategy, price and commercial channels

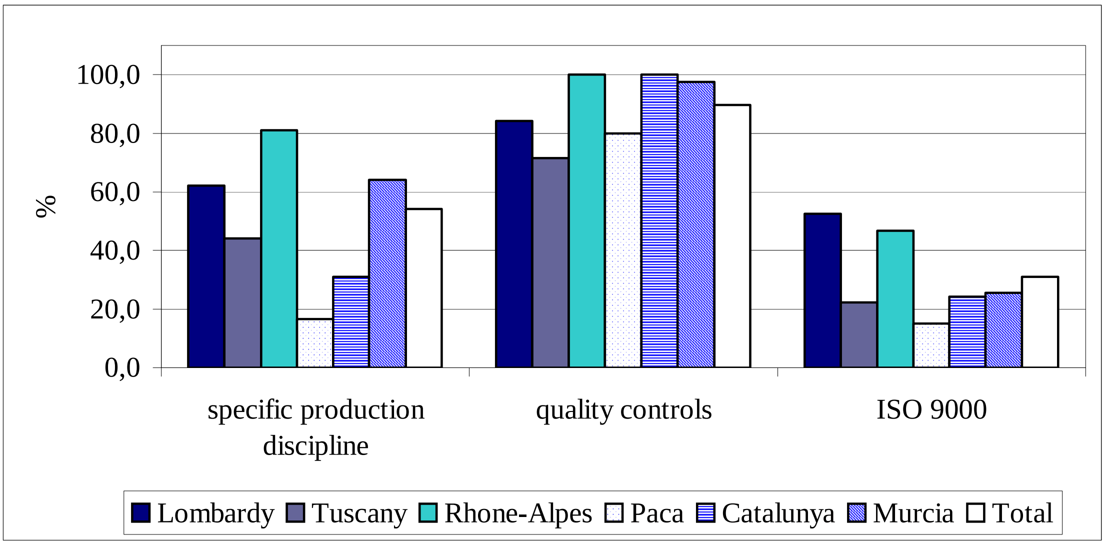
According to the economic framework outlined before, a relevant problem emerging from the survey involves the guaranteeing of safety and quality levels for organic products, since this is considered an essential feature to comply with the consumers requirements relative to organic food and to gain a premium price.

In the six regions, taken as a whole, 54% of the firms have adopted even more restrictive production standards than those set out in the EU general regulations for organic production (fig. 1). In addition, 90% of firms state to carry out quality controls, either through their own internal laboratories or by availing themselves of external services. However, the diffusion of ISO 9000 certification still appears limited, and has been adopted by only 31% of the companies.

In terms of individual regions, production regulations are particularly widespread in Rhone-Alpes, Lombardy and Murcia, whereas in Paca and in Catalunya these quality instruments are implemented by a low number of sample firms. The quality controls are widespread in all the six regions. Moreover, the two regions in which a significant number of firms have adopted ISO certification are Lombardy and Rhone-Alpes.

In this regard, it is interesting the case of Lombardy, where the firms interviewed underline the importance of quality controls for organic products and 65% of them state that existing controls are adequate. The role of the controls can be connected to the fact that possible scandals in the organic sector can seriously compromise the image of these products for the consumer, and can therefore have a negative effect on firm profitability.

Figure 1 – Use of quality standard certifications in the processing firms



Source: our survey

An aspect related to safety and quality attributes of organic products is represented by their higher prices with respect to those of conventional products (table 2). The survey revealed that for 10% of the firms prices are increased more than 40%, for 37% the premium-price lies between 20% and 40%, while for 36% of the firms the price increase ranges from 10% to 20%. On the other hand, for 17% of the firms no increase in prices is practised.

Tab. 2 - Average premium price of organic products vs. conventional products for processing firms

Regions	*None*	*10%-20%*	*20%-40%*	*40%-80%*	*More than 100%*	*Total*
			%			
Lombardy	32,4	41,2	20,6	5,9	0,0	100
Tuscany	27,3	30,3	27,3	9,1	6,1	100
Rhone-Alpes	14,3	42,9	42,9	0,0	0,0	100
Paca	5,0	45,0	35,0	10,0	5,0	100
Catalunya	4,0	8,0	72,0	12,0	4,0	100
Murcia	9,4	46,9	31,3	12,5	0,0	100
Total area	**16,9**	**36,0**	**36,6**	**8,1**	**2,3**	**100,0**

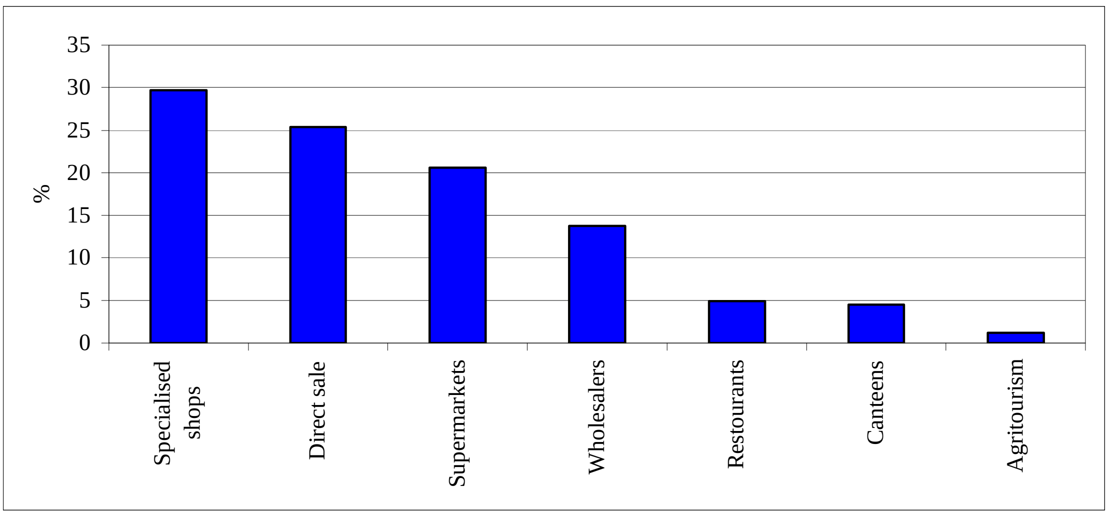
Source: our survey

With reference to individual regions, increases in prices of between 20% and 40% are noted by 72% of the firms in Catalunya and 43% of the firms in Rhone-Alpes, while increases of between 10% and 20% characterise the majority of firms in Murcia, Paca and Lombardy. In addition, in the two Italian regions, approximately 30% of firms state that they have not noted any price increases for organic products with respect to conventional ones.

With regard to trade channels for the processing firms, in the survey 29% of the firms use the channel represented by specialized shops in organic products (fig. 2); this channel appears particularly important in regions such as Paca and Catalunya. Direct sales also play a significant role in commercialisation, with 25% of firms, while only 21% of the firms state to use supermarkets as main trade channel. Among the other commercialisation modalities, wholesale trading is used by 14% of firms, while canteens, restaurants and agritourist activities constitute channels that are not widely used for organic products. In addition, exports also can represent a commercial channel for organic products, as in the case of Rhone-Alpes, Paca and Murcia.

It is interesting to note that most of the firms supplying supermarkets (63%) use specific contracts for the commercial relations of organic products. For processors contracts with supermarkets make it possible to reduce the level of risk relative to sales, and help to define qualitative specifications for organic products, even if supermarkets have a strong bargaining power.

Figure 2 - Most relevant trade channels for organic products



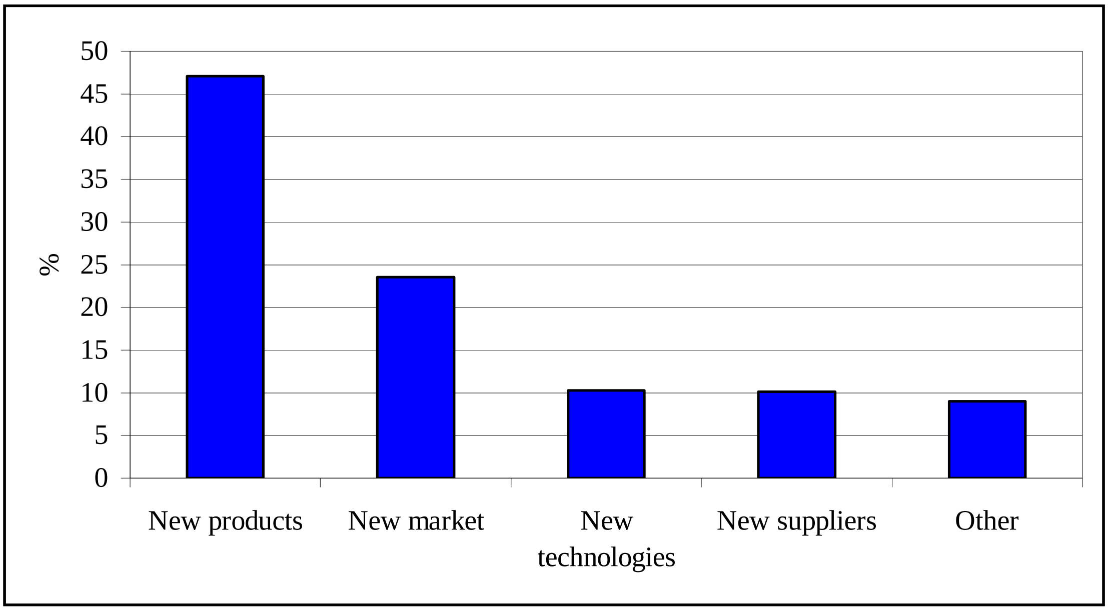
Source: our survey

With regard to the perspectives of development for organic products, 75% of the firms declare that intend to develop this sector in the future, indicating that the organic market enjoys possibilities for further growth.

The number of the firms that intend to increase organic products is particularly high in Murcia and in French regions (more than 80%), while it appears to be limited (51%) in Lombardy, where the market do not show an increasing trend.

The development of organic production is mainly based on new products for 47% of the firms and on new markets for 24% of the firms (fig. 3). Moreover, as regards innovation, in recent years 60% of the firms have carried out research and development activity, based mostly on internal resources.

Figure 3 - Main implemented action to develop organic products



Source: our survey

4.2 Raw materials supplying and vertical coordination with agriculture

With regard to the raw materials provisioning, almost half the firms (45%) use agricultural commodities for the transformation process, while a further 27% use semi-finished items together with agricultural raw materials. Hence, the quota of firms that have a direct connection with farms is equal to 72%. On the other hand, 22% of the firms use, for the most part, either semi-finished items or finished products, carrying out a second transformation or packaging phase activity (tab.3).

It is therefore possible to say that, in general, the organic production chains display more intensive vertical coordination between agriculture and the processing sector than conventional chains, and this is evident in the high level of purchasing relative to raw materials and agricultural semi-finished items.

More specifically, in Lombardy, Tuscany and Murcia supplies for more than 60% of firms are based on agricultural raw materials, while in Rhone-Alpes some 78% of firms use both agricultural and semi-finished products.

Tab. 3 - Types of inputs utilised in the organic processing

Regions	*Agricultural raw materials*	*Semifinished products*	*Agricultural raw materials + Semifinished products*	*Finished products*	*Other*	*Total*
			%			
Lombardy	65,8	21,1	7,9	5,3	0,0	100,0
Tuscany	60,6	9,1	6,1	18,2	6,1	100,0
Rhone-Alpes	10,8	10,8	78,4	0,0	0,0	100,0
Paca	30,8	15,4	15,4	11,5	26,9	100,0
Catalunya	34,5	31,0	34,5	0,0	0,0	100,0
Murcia	60,5	2,6	18,4	10,5	7,9	100,0
Total area	**44,8**	**14,4**	**27,4**	**7,5**	**6,0**	**100,0**

Source: our survey

The geographical markets on which firms purchase their supplies are mainly represented by national markets (31% of firms in the sample) and by local markets (30%), though the regional market also appears significant (22%) (tab. 4).

On the other hand, the role of foreign markets appears to be quite limited relative to supplies purchasing: only 16% of firms state that they purchase most of their supplies abroad. As regards imports, it is important to consider quality problems due to different regulations in EU and non-EU countries.

However, in the case of Rhone-Alpes, foreign supplies assume a greater degree of relevance, since it is the path chosen by 35% of firms. In Paca too, supplies abroad appears to be significant (24% of firms), though in this region, 48% of firms carry out their purchasing on the national market. On the other hand, supplies via the local market is especially prevalent in Tuscany (47%) and Catalunya (59%).

Tab. 4 - Markets of organic purchasing for the processing firms

Regions	*Local*	*Regional*	*National*	*Foreign EU countries*	*Foreign non EU countries*	*Total*
			%			
Lombardy	21,6	29,7	32,4	13,5	2,7	100,0
Tuscany	47,2	22,2	25,0	2,8	2,8	100,0
Rhone-Alpes	13,5	16,2	35,1	18,9	16,2	100,0
Paca	16,0	12,0	48,0	16,0	8,0	100,0
Catalunya	58,6	10,3	24,1	6,9	0,0	100,0
Murcia	26,3	36,8	26,3	2,6	7,9	100,0
Total area	**30,2**	**22,3**	**31,2**	**9,9**	**6,4**	**100,0**

Source: our survey

As regards supplies modalities, the majority of firms (55%) use, for input purchasing, supply contracts, while the spot market is used by 23% of firms (tab. 5). It should also be noted that contracts between farms and processors represent an instrument that encourages a strong production connection between the two phases of the chain, permitting a greater degree of vertical coordination, which also makes it possible to specify quality features for the raw materials.

Within the context of individual regions, contracts are particularly important in the two Italian regions (70% of the firms) and in the two Spanish regions (51% of firms), while the spot market enjoys greater significance in the French regions.

Tab. 5 – Type of purchasing for the processing firms

Regions	*Supply contracts*	*Spot-market*	*Goods stock exchange*	*Other*	*Total*
			%		
Lombardy	70,3	13,5	0,0	16,2	100,0
Tuscany	70,6	17,6	0,0	11,8	100,0
Rhone-Alpes	45,9	51,4	2,7	0,0	100,0
Paca	33,3	57,1	0,0	9,5	100,0
Catalunya	51,7	0,0	0,0	48,3	100,0
Murcia	51,4	8,6	0,0	40,0	100,0
Total area	**55,4**	**23,3**	**0,5**	**20,7**	**100,0**

Source: our survey

4.3 Vertical coordination with retailing

With regard to vertical relations between processors and retailers, the majority of the processing firms (60%) have not indicated any excessive bargaining power on the part of their customers. This fact can be explained by the significant diffusion of commercial channels which do not exercise strong vertical competition, as the organic specialized shops and direct sales.

However, in the case of Murcia and Lombardy most of the firms (79% and 53% respectively) consider their customers' bargaining power to be excessive, due to the fact that supermarkets are the main trade channel in these regions.

To analyse in more details the vertical relationships between processors and retailers a survey was carried out on retailers of organic products. The sample of retailing firms is composed by small shops specialized in organic products (92%) and supermarkets (8%), as it was outlined before.

Vertical coordination between processors and retailers is influenced by two main factors: the first one is relating to the retailers strategies for organic products, the second one to the supply chain constraints.

With regard to retailers strategies, as we pointed out in the economic framework, the retailers choice to sell organic products is related to the consumer willingness to pay a premium price for quality and safety attributes. The retailers consider the quality of organic production to be an advantage in characterising the sector.

The survey underlines that the premium price most frequently applied by retailers ranges from 10 to 40% (tab. 6). Indeed, 46% of the retailing firms declare that they apply a price increase of 10-20%, with respect to conventional products, while 40% apply increases of 20-40%. None of the firms applies increases greater than 100%, and only a few firms increase prices by 40%. A very small proportion (8%) of retailers in the organic product trade declare that they do not apply any premium price. These values appears in line with those revealed in the analysis of processing firms.

With regard to supply chain constraints, the survey underlines that the purchasing price of organic products is indicated as an important factor limiting an adequate development of retailer activity by 35% of firms (tab. 7). Even if, in the same time, retailers strategic decisions planned for future years mainly focus on consolidating the commercialisation of organic production.

Tab. 6 – Average premium price of organic products vs. conventional products for retailers

Regions	*None*	*10% - 20%*	*20% - 40%*	*40% - 80%*	*More than 100%*	*Total*
			%			
Lombardy	28,6	14,3	42,9	14,3	0,0	100,0
Tuscany	10,0	50,0	40,0	0,0	0,0	100,0
Rhone-Alpes	6,3	87,5	6,3	0,0	0,0	100,0
Paca	6,3	43,8	37,5	12,5	0,0	100,0
Catalunya	7,1	7,1	85,7	0,0	0,0	100,0
Murcia	0,0	55,6	33,3	11,1	0,0	100,0
Total area	**8,3**	**45,8**	**40,3**	**5,6**	**0,0**	**100,0**

Source: our survey

Tab. 7 - Issues that should be improved by the suppliers of retailers

Regions	*Delivery time*	*Reliability in delivery / overall quality of the service*	*Price*	*Innovation rate (add new references)*	*Flexibility in changing pre defined delivery plans*	*New co-operative / innovative processes in logistics management*	*Total*
				%			
Lombardy	0,0	37,5	50,0	0,0	12,5	0,0	100,0
Tuscany	40,0	10,0	50,0	0,0	0,0	0,0	100,0
Rhone-Alpes	0,0	37,5	12,5	43,8	0,0	6,3	100,0
Paca	6,7	26,7	33,3	26,7	0,0	6,7	100,0
Catalunya	40,0	10,0	30,0	10,0	5,0	5,0	100,0
Murcia	10,0	10,0	65,0	15,0	0,0	0,0	100,0
Total area	**17,7**	**21,5**	**36,1**	**18,4**	**2,5**	**3,8**	**100,0**

Source: our survey

In the Murcia region the quota of retailing firms that perceives the high cost of raw materials as the crucial factor relative to their relations with processing firms is equal to 65%, while in Tuscany and Lombardy is 50%, and in Paca and Catalunya is approximately 30%. In Rhone-Alpes, on the other hand, only a small quota of firms (13%) perceive price as a limiting factor in the relation with processors.

In addition to the item price constraints, organisational matters with processors could certainly be improved, especially as regards both product delivery times, where 18% of firms complain of long delays, and reliability of agreed delivery times (and service quality level), with 21% of the firms indicating a lack of respect for agreed delivery schedules.

The survey highlight that product innovation rate is also relevant for organic production development: 18% of retailing firms complain a poor levels of new products and service. The demand for new products enjoys particular relevance in the French area, both in Rhone-Alpes and Paca.
With regard to the perspectives of development, most of retailers state that intend to develop the commercialisation of organic products in the future. On the other hand, as a consequent of the above mentioned aspects about the quality strategies and supply chain constraints, most of retailers consider the selling price of organic products as the main weakness to an adequate development. Moreover, in almost all the regions analysed, the consumer's lack of awareness concerning the advantages of organic products is cited as a limiting factor to further sector development. This is confirmed by a need to clarify the position of organic products in the market and to rationalise the extent and use of brand names/logos, together with a need to increase marketing and promotion actions.

5. Concluding remarks

The analysis revealed that a relevant aspect for the processing firms of organic products concerns the guaranteeing of safety and quality levels for the products, according to the economic framework emerging from the literature. The instruments to implement the quality management are based on the adoption of specific production regulations and quality controls. The premium price that the processing firms can gain, for 37% of the firms of the sample, lies between 20% and 40%, while for 36% of the firms the price increase ranges from 10% to 20%.
The main trade channels for the processing firms are represented by specialized shops in organic products, direct sales and supermarkets. The majority of firms have not indicated any excessive bargaining power on the part of their customers. This fact can be explained by the significant diffusion of commercial channels which do not exercise strong vertical competition, as the organic specialized shops and direct sales. Otherwise, in the relations between processors and supermarkets the vertical competition is quite strong.
With regard to the vertical relations between processing firms and agriculture, in general the organic production chains display more intensive vertical coordination than conventional chains, and this is connected to two factors: firsts, the geographical areas

where the firms purchase their raw materials are mainly represented by national, regional and local markets; second, the majority of processing firms use, for input purchasing, supply contracts that permit a greater degree of vertical coordination, making possible to specify quality features.

With regard to the vertical relations between processing firms and retailing firms, also for the retailers the quality of organic production represents an advantage in characterising the sector and the consumer willingness to pay a premium price for organic product is connected to quality and safety attributes. On the other hand, the purchasing price of organic products is indicated as an important factor limiting an adequate development of retailer activity.

With regard to the perspectives of development for organic products, both processors and retailers state that intend to develop this sector in the future, even if in some regions, as Lombardy, the market for organic products do not show an increasing trend in the last years. Finally, the survey underlines a need to clarify the position of organic products in the market, to rationalise the use of brand and to increase marketing and promotion actions.

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