System Dynamics and Innovation in Food Networks 2009

Proceedings of the 3rdInternational European Forum on System Dynamics and Innovation in Food Networks, organized by the International Center for Food Chain and Network Research, University of Bonn, Germany
February 16-20, 2009, Innsbruck-Igls, Austria
officially endorsed by

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M. Fritz, U. Rickert, G. Schiefer
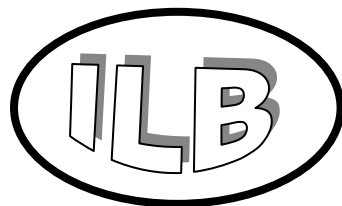
Consumer and Supply Chain Dynamics in the Portuguese Organic Milk Market

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Abstract

This study explores consumer demand for organic milk products (OMP) and prospective developments in OMP supply chain in Portugal. Consumer demand is approached through a survey accomplished with a stratified sample of 625 consumers from the Porto Metropolitan area (north Portugal), whose population provides a broad representation of Portuguese. Likely future developments in the Portuguese OMP supply chain are established for 2015 time horizon through the Delphi technique, using a panel of 27 qualified experts from different professional backgrounds. Results show *inter alia* that there are among consumers significant lack of knowledge and conceptual distortion about the organic notion. Cluster analysis has led to the detection of three differentiated consumer groups. Besides, over the coming years Portugal presumably will not be capable to produce sufficient organic milk to satisfy its domestic demand which probably will reach 5% of total milk consumption by 2015 (face to 1.25% in 2008); therefore resorting to importation will continue. Moreover, average willingness to pay for OMP is expected to be by that horizon around 22% more than for conventional counterparts. For the Portuguese OMP industry, improving production efficiency and adopting best management practices appear to be prerequisite for achieving business sustainability and competitiveness.

Keywords: *Organic milk, consumer behaviour, supply chain, Portugal*

1. Introduction

As many other countries, Portugal is promoting organic farming for a variety of reasons. Organic farming is recognised as having a beneficial impact on ecosystems and sustainable agricultural and rural development (Hamm et al., 2002; Willer and Kilcher, 2009). It is also perceived as contributory solution to continued loss of biodiversity (Hole et al., 2005; Fuller et al., 2005). Moreover, recent food safety crises (BSE, salmonella, E Coli, dioxins) induced a shift towards organic products perceived by many as safer than conventional counterparts.[1] At supply chain level, the high concern about environment is increasingly forcing modern food supply chains to green their operations (Morton, 2006). This occurs in a context where the interchange function is gradually shifting from transaction to relation-oriented paradigm and from domestic to global sourcing.

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1.   Controversy surrounds safety claims on organic vs. conventional milk products, since it appears that these claims are not conclusively supported by scientific evidence (Bishop, 2007). Moreover, it should be emphasised that the definition of organic refers to farm management practices (i.e. the process), not the product itself, thus it is not a judgement about the quality or safety of the product.

The organic agriculture sector in Portugal still is very small. In 2005, 315,000 hectares (around 8% of total utilised agricultural area) and 2,163 operators were devoted to organic production (MADRP, 2006). In the dairy sector, most of the organic milk used in the Portuguese market is imported as domestic production still is uncommon and insignificant. Presently there are in Portugal solely four organic milk producers producing 0.5 Million litres, which represents less than 1% of total domestic organic milk consumption. Other 16 producers are in transition from conventional to organic producing.[1] Globally, the whole dairy sector is experiencing a restructuring process prompted by changing societal and market requirements in terms of demand diversification, product innovation, environmental sustainability and power re-distribution along the food supply chain.

Organic milk and milk products (OMP) is an emerging and one of the fastest growing segments of the dairy market in Portugal. Between 2006 and 2008 OMP consumption has quadrupled, although still it represents a quite small share of total dairy consumption (1.25% in 2008).[2] Meanwhile, per capita consumption of conventional milk remains stabilised at approximately 94 litres per year, which is slightly above the EU average (INE, 2006). The market value for OMP amounted to 17 Million euros in 2006. Qualitatively, factors such as quality, safety and environmental protection increasingly are becoming major drivers of Portuguese consumer decision-making.

Despite the increasing importance of OMP as a novel and fast-growing segment within the overall mature Portuguese dairy industry, no comprehensive studies has been conducted regarding this market, for which there also exist no structured data. Therefore the purpose of this contribution is to attempt to palliate this lack through 1) investigating real demand and consumer features for OMP in Portugal, and 2) exploring likely developments in the Portuguese milk supply chain over the coming years, particularly in relation to demand dynamics. The next section describes the methodology used. Section 3 summarises the main results obtained. Finally, Section 4 sets out some concluding remarks and further research needs.

2. Methodology

One of market research methods to collect primary information is direct observation. To obtain situational information regarding organic milk consumer market, hypermarkets were visited to gather data on a set of variables such as product range, price, product origin, packaging and positioning on the shelves. In the selection of hypermarkets three criteria have been considered:

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1. At the EU-25 level, 5% of the milk specialised farms represented by FADN (Farm Accountancy Data Network) produce organic milk, and 1% are converting to organic production or applying both organic and other production methods (European Commission, 2009).

2. Organic milk is one of the biggest segments of growth of the dairy industry in many wealthy Western countries, increasing in many markets at double digit rates. Demand is boosted by studies linking the product with health benefits (higher content of beneficial fatty acids, antioxidants, and vitamins (Butler *et al.*, 2008), ethical motivations (improved health and treatment of livestock) and environmental protection (cleaner environment, ecologically sustainable agricultural system (de Boer, 2003). At the European level, organic drinking milk reached 1.1 billion litres in 2007, according to Organic Monitor. Germany has the largest consumer market for organic milk in Europe, followed by the United Kingdom and France. In the United States retail sales of organic milk have been growing since the mid 1990s, reaching a value estimated at over one billion dollars in 2005, up 25% from 2004 (Dimitri and Venezia, 2007). Meanwhile, world consumption of conventional milk has not experienced significant changes. Prospectively, conventional milk consumption might even decrease in some major world consuming markets such as the EU-15 (Bouamra-Mechemache *et al.*, 2008).

volume of sales (selected hypermarkets account for slightly more than 50% of food distribution turnover in 2006), geographical proximity to large centres of consumption and customer services of each hypermarket.

In a second step, a consumer survey has been conducted in Porto Metropolitan area (north Portugal) in order to characterise OMP consumption. The 1,260,680 population of this area provides a broad representation of the whole country. A total of 625 consumers randomly selected have been surveyed face-to-face in the area of study. Considering the differences between districts of Porto area, the sample used has been stratified proportionally to the population size of each district. Stratification allows for reducing the variance sources, thus some errors of interpretation are minimized when the sample as a whole is considered. Under confidence level of 95% and $p=q=50\%$ hypothesis, the resulting maximum error range is 8%. Table 1 shows the number of the interviews accomplished in each district.

In preparing the questionnaire, a critical revision of secondary information -mainly international- has been carried out. The variables under analysis have been sources of information about OMP, knowledge, perspectives of future consumption, places of purchase, frequency of purchase, monthly spending, product characteristics, frequency of consumption, image of organic products, price, reasons for purchase, quantities purchased, behaviours and life styles, area of residence, gender, age, level of education, social class and income.

After data collection, a descriptive analysis has been carried out to understand the general structure of results. In order to explore correlations between variables, a bivariate analysis has been developed. Subsequently, using factor analysis, main dimensions or factors explaining inter-relationships between variables have been established. Finally, a cluster analysis has been performed to identify differentiated consumer segments.

Table 1. Consumer survey responses

Districts	Sample
1. Gaia	134
2. Porto	126
3. Gondomar	80
4. Matosinhos	79
5. Maia	60
6. Valongo	46
7. Vila do Conde	39
8. Póvoa de Zarsim	34
9. Espinho	27
Total	625

The next step has been to explore likely relevant trends and developments in the Portuguese organic milk supply chain during the coming years, in particular whether it will be possible to satisfy OMP Portuguese demand through domestic suppliers. The Delphi method has been used to qualitatively forecasting these likely developments by the 2015 time horizon.[1] Twenty seven experts from business, administration and academic backgrounds have contributed their judgements about most important aspects concerning the future of the organic milk supply chain

in Portugal. Two rounds with controlled feedback using two similar web-based questionnaires have been performed. Questionnaires are structured into four sections: consumption and demand features, supply and production conditions, distribution, and certification and management issues. In the questions posed in the questionnaire, some concepts were evaluated using five-point Likert-type scale, whereas for others it was a matter of establishing a forecast for specific figures.

3.   Results

3.1. Consumer demand for OMP

Data obtained from direct observation at points of sale confirm the existence of an emerging consumption of OMP in Portugal. The majority of OMP offered originates from other EU countries, mainly France and Spain. The most frequently-found product range is liquid milk in its three versions (whole, semi-skimmed and skimmed) and in brick packaging. There are also organic yoghurts, cheeses, butter and milk desserts. Private brands have also been detected, mainly in liquid organic milk. Regarding prices, the stated price of a litre of semi-skimmed organic milk was on average 78% higher than its conventional counterpart (the maximum price premium found was 120%).

At consumer level, results of consumer survey indicate that 40% of respondents already have consumed at least once an OMP. On the contrary, 60% never had contact with such products. Of those, 10.3% state that they will consume them in the medium term. However, for 80.2% of those to do so, some factors should change, in particular more information should be available and prices should be lower.

Regarding awareness and level of knowledge of organic products, Figure 1 illustrates that there is a considerable lack of knowledge among consumers to an extent that around 20% have no idea about what is an organic agricultural product. However, the large majority (72.5%) have heard about it although they do not know the definition or are not capable to differentiate organic from other farming methods. There are in fact conceptual distortions between what is an organic product and a natural or integral one, even though 74.5% agreed or completely agreed with the statement that OMP are products free of synthetic chemical substances. Only 7.9% of participants know the organic agriculture concept, being able even to mention the definition.

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1. Broadly, the Delphi method is based on expert consultation where knowledgeable experts are asked in an ordered and iterative process for their opinions about future occurrences (Ziglio, 1996). Used for forecasting purposes, this method allows for taking-up the most relevant dimensions of a complex problem or issue and the way they combine, thus generating a forecast from a truly systemic perspective (Mili and Rodríguez Zuñiga, 2001).
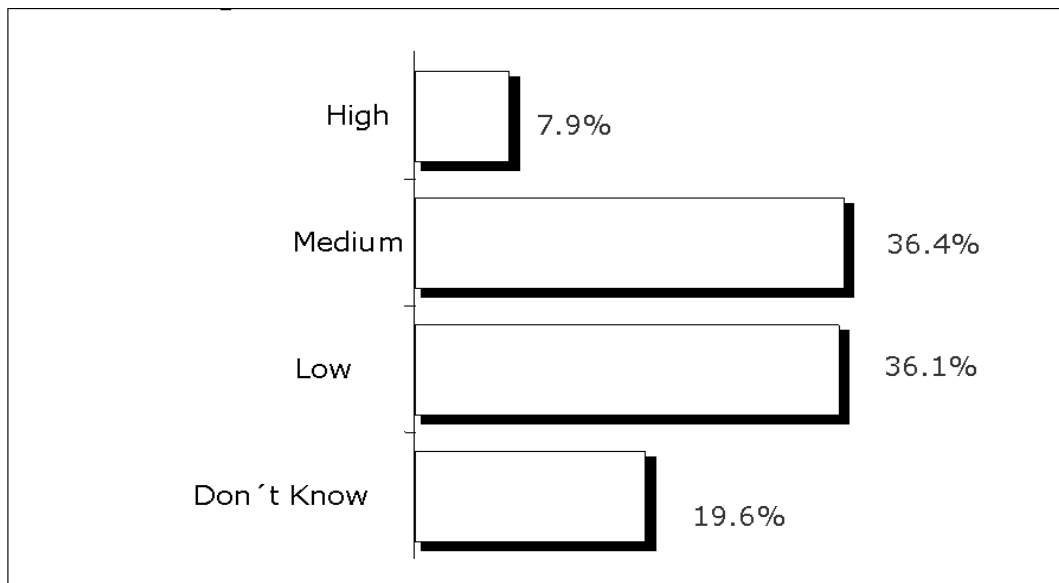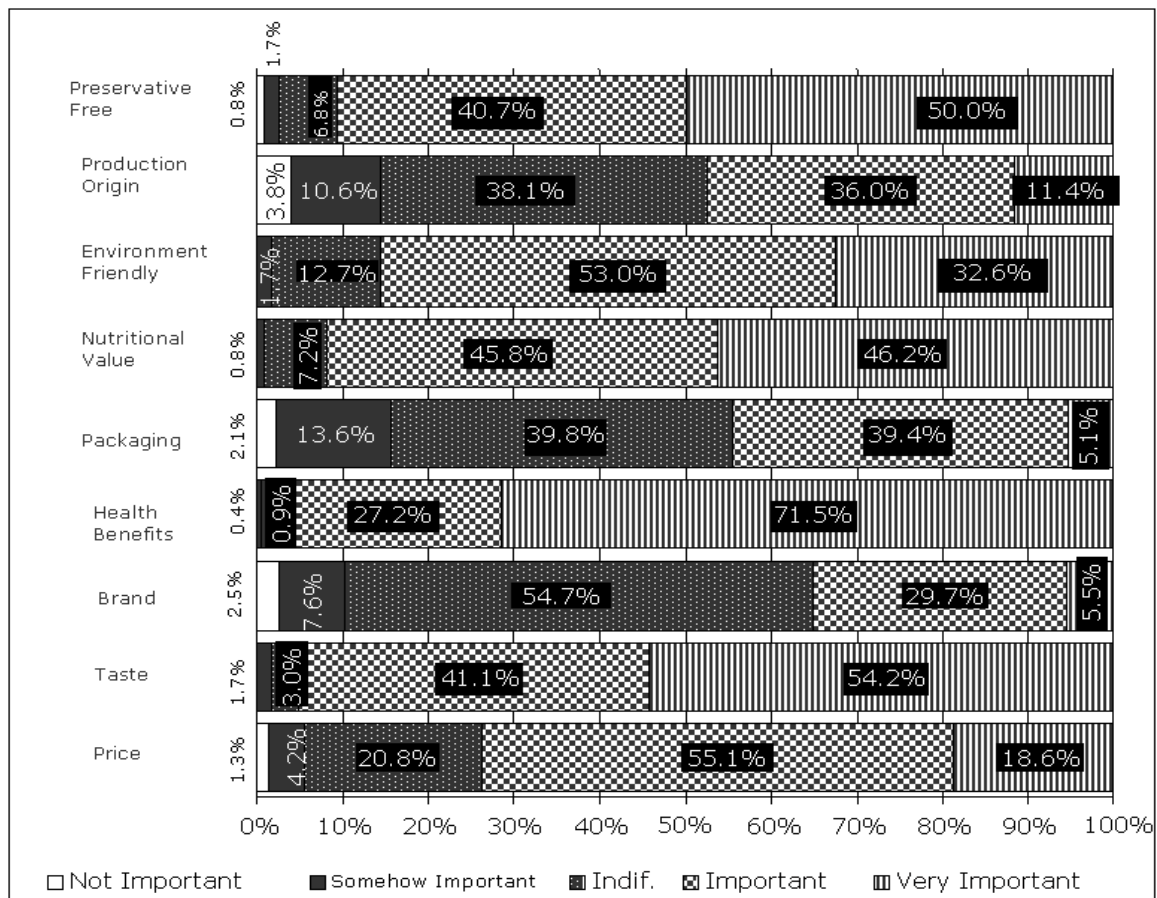
Source: Consumer Survey, Rui Rosa Dias, 2006.

Figure 1. Degree of knowledge of organic products

With regard to attribute valuation, health benefits represent the largest share of favourable opinions. As shown in Figure 2, the perceived positive impact that OMP may have on respondents' health and health of their families concentrates 98.7% of positive perception (important or very important), followed by taste (95.3%), nutritional value (92%), absence of preservatives (90.7%) and environmental benefits (85.6%), respectively.[1] Meanwhile, the relative importance of price (73.7%), product origin (47.4%), packaging (44.5%) and branding (35.2%) is comparatively lower, even though these also are relevant attributes.

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1. This is in line with research findings in regard to organic foods in general (Haccius, 2005; Fuentes and Lopez de Coca, 2008; Sawyer *et. al*., 2009).

Figure 2. Attributes of organic milk products

As expected, there is a powerful correlation between health concerns and the degree of knowledge about these products. Put differently, consumers with higher level of knowledge demonstrated to be more health conscientious and also are more willing to pay for OMP. In addition, they are those who organise their lifestyle on a constant practice of a healthy diet, physical exercise and the purchase of chemical and additive-free food. Other variables also presented strong correlation, like family income and the level of consumption of OMP, being those households having higher income levels who consume more OMP. Regarding correlation between brand valuation and consumption, those valuing more the brand factor are in general who consume less OMP.

The application of the cluster technique has led to detecting relatively homogenous groups of consumers whose behaviours, habits and attitudes were grouped for being quite similar. Three differentiated segments have been identified.

The first segment values most the information about OMP given by audiovisual media: television, radio, mainly (Figure 3). Consumers in this cluster also value and support their purchase choices on the basis of the personal factor: friends, relatives (social media). The valorisation of the food/health binomial is higher than of the environment attribute. Meanwhile the price is a decisive factor when purchasing when compared with intrinsic and other extrinsic characteristics: taste, colour, smell, packaging and brand.
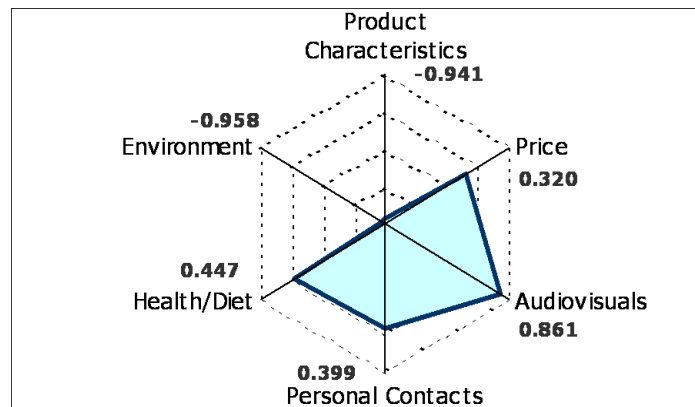
Figure 3. Cluster 1

This segment is formed by 63.6% of women, young and also a significant percentage of old people, with a lower to middle level of education, middle class, having a family income between 1,000 and 2,000euros per month, live in the peripheral districts and realise most of their shoppings in hypermarkets. This cluster represents 34% of the sample, and only approximately 25% consume OMP on a daily basis. Apparently it is to this segment that true organic consumers belong - those who constantly consume OMP, which somehow explains the personal factor option as main source of information.

The analysis of the second cluster (Figure 4) reveals that the main sources of information used by members of this group when shopping OMP are friends and family (social media). They are characterised by usually frequenting organic product markets and fairs and they use mostly direct personnel communication in the divulgation of OMP. In general they show a big concern about the environment and part of them belongs to environmental movements and associations. Contrarily to the previous segment, taste, colour, smell, external appearance and packaging, are attributes just as important as the area of production or brand. More than half (55%) are women, 88.5% of them belong to the 20 to 49 age group, and approximately 50% have high level of education. They belong mostly to the middle and upper classes with family income between 2,000 and 3,000 euros per month.
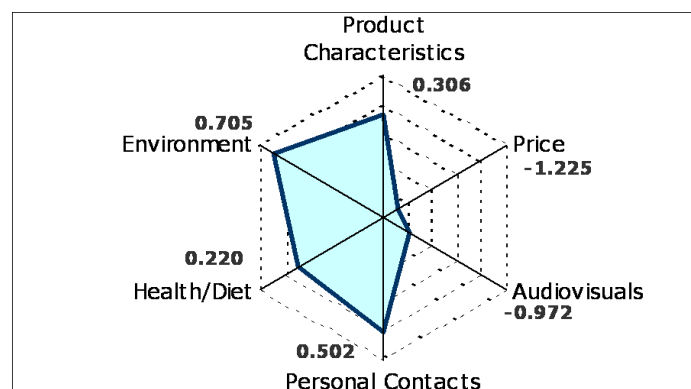

Figure 4. Cluster 2

On average these consumers are willing to pay between 10% and 25% more for OMP, figures slightly higher to those corresponding to the previous segment. They purchase food mainly in

hypermarkets; however, 21% buys from dietetic shops and stores specialised in organic products. A reduced percentage buys directly from the producer. A large number of them live around the Porto city centre. This segment represents 50% of the sample being daily consumers only 25% of its members.
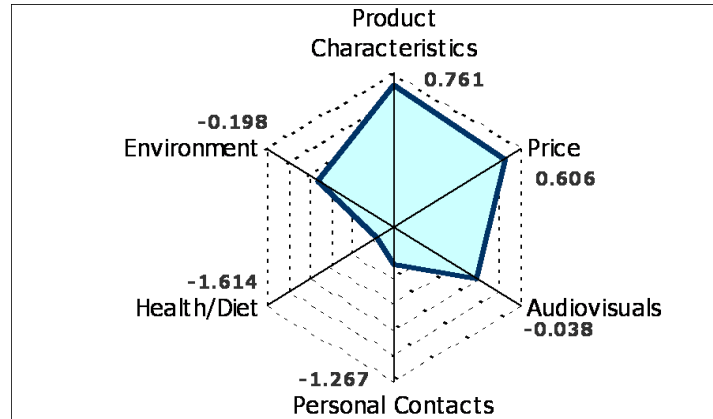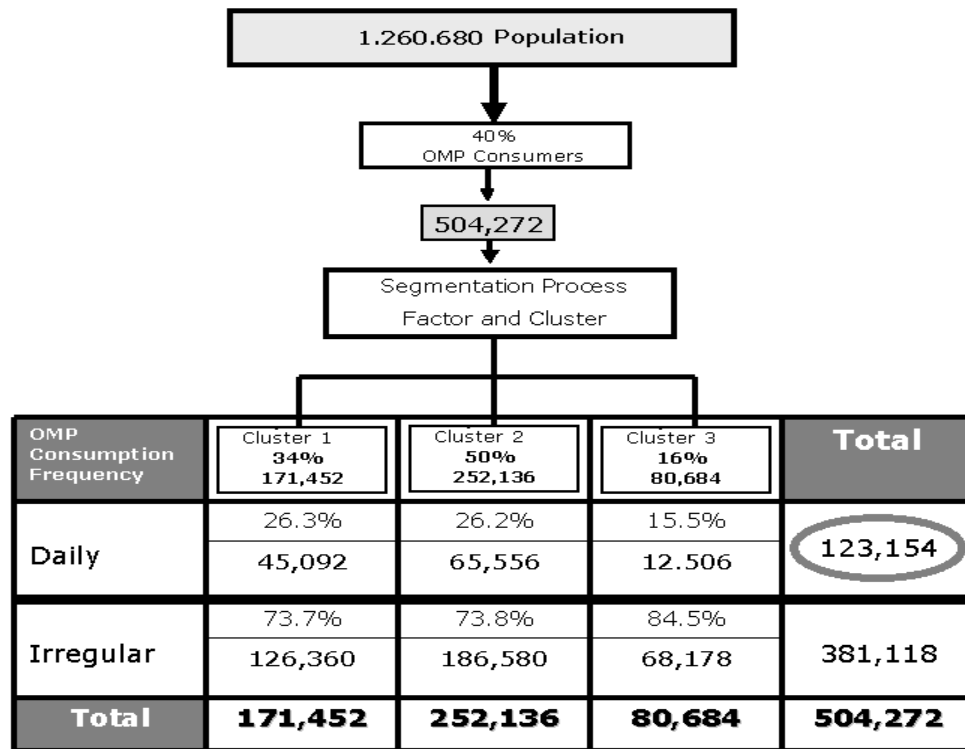

Figure 5. Cluster 3

The third cluster (Figure 5) groups those consumers who base their OMP purchase decisions mainly on the value for money factor. For this group, the smallest of the three clusters (16% of the sample) quality is associated to the area of production (geographical origin) and organoleptic characteristics. Formed by 62% of women, it is the youngest of the three clusters. Around 59% have high level of education and 25% pertain to upper-class. In addition, this group presents high family income levels and the highest level of knowledge of organic agriculture. Furthermore, its members show higher predisposition to pay more for an OMP. The large majority lives in the city main centre. They practice sports on regular basis and are highly sensitive towards environmental and health issues.

In short, quantitatively the actual demand in Porto is made up by 504,272 consumers, of which 123,154 are daily consumers (Figure 6). There is a potential market of around 381,000 consumers having already consumed an OMP at least once. Of the 756,408 consumers that have never consumed these products, approximately 78,000 (10.3%) may do so during the next three years.

OMP Consumption Frequency	Cluster 1 34% 171,452	Cluster 2 50% 252,136	Cluster 3 16% 80,684	Total
Daily	26.3% 45,092	26.2% 65,556	15.5% 12.506	123,154
Irregular	73.7% 126,360	73.8% 186,580	84.5% 68,178	381,118
Total	171,452	252,136	80,684	504,272

Source: Consumer Survey, Rui Rosa Dias, 2006.

Figure 6. Demand for organic milk products in Porto

3.2. Supply chain prospective developments

Taking into consideration actual situation in demand and market features, a Delphi survey has been conducted to gain insights into future dynamics of the Portuguese OMP supply chain. Below is a summary of selected consensual views emerging from the Delphi process, from which a series of policy and managerial implications could be derived to prompt proper development of OMP supply chain. Note that the quality of results has been assessed according to widely accepted criteria in the professional literature such as internal consistency of responses, an accepted degree of statistical dispersion and minimum threshold of response rates. Figure 7 shows factors the expert panel considered most relevant for the Portuguese OMP supply chain over the coming years, ranked according to their relative importance assessed on a 1 (not important) to 5 (very important) scale.

Results clearly suggest that the Portuguese OMP supply chain will develop following a demand-driven rather than a production-driven perspective. Factors like health, nutritional value and environmental protection are expected to increase their relevance as chief consumption drivers. Quantitatively, OMP consumption in Portugal is expected to increase to probably reach 5% of total milk consumption by 2015 (for the EU as a whole the panel consensual forecast is 10%).[1] Per capita consumption of organic milk in Portugal is expected to attain 4.5 litres by that horizon. A generic national promotion campaign of organic products coupled with strengthened environmental education would presumably accelerate this process. Compared

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1.   Although available information reveals that current economic crisis is modifying significantly consumers' behaviour towards greater contention in spending and shift in priorities, recent studies point out that in the United States and Western Europe demand for green products and healthy food will continue to grow in the coming years, however consumers will be more demanding and less willing to pay for them (Creafutur, 2008; The Economist, 2009).

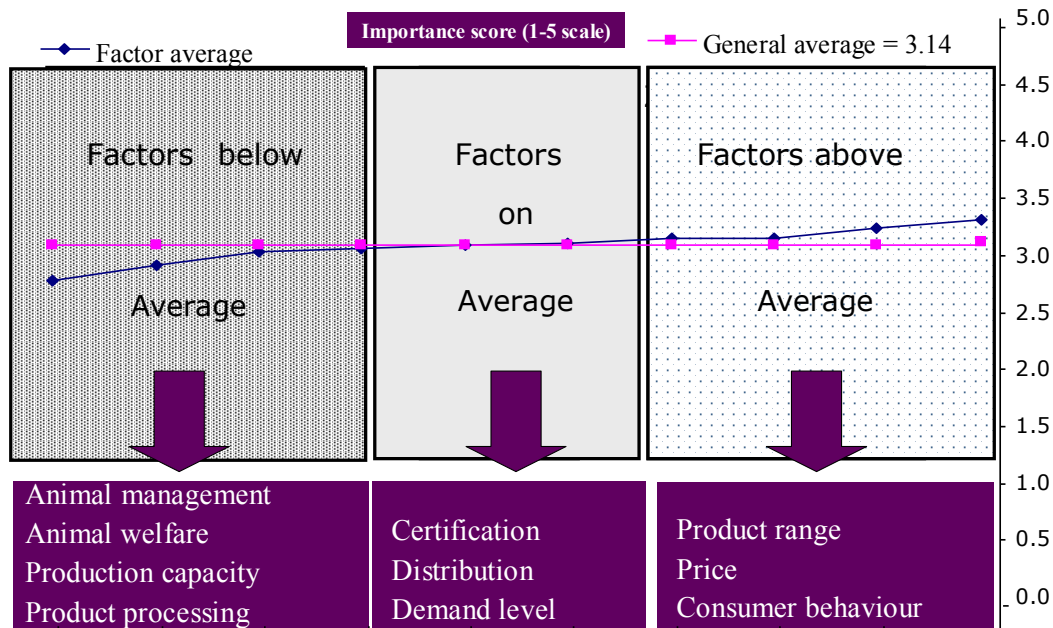with conventional milk products, the WTP for OMP might be on average 22% higher.

Figure 7. Prospective relevant factors for Portuguese OMP supply chain

On the supply side, while a significant increase in OMP supply will be required to respond to expected rise in consumption, experts argue that by 2015 Portugal will not be capable to produce sufficient organic milk to satisfy its domestic demand, even if many Portuguese dairy farmers and companies are expected to be increasingly interested in this market segment and likely will deploy investments for its development. In this context, taking into consideration the factors relating to land needs and costs of recollection, the areas with greater potential for production will be "Tras-os-Montes" (northeast) and "Beira Litoral" (centre-west).[1] In these milk production zones, environmental problems are not so pronounced as in other areas.

At distribution level, the panel argues that retail distributors likely will offer wider and deeper OMP product ranges, and at the same time will dedicate more specific spaces to the organic concept. Another strong consensus indicates that hypermarkets will continue to be the leading format to OMP marketing (currently hypermarkets account for 80% of total OMP sales in Portugal). Moreover, smaller speciality formats with sophisticated concepts and personalised services, as well as direct producer-consumer channels, may increase their market share and contribute to improve OMP overall market positioning.

Within this scenario, information and communication technologies (ICT) will be paramount for OMP marketing and efficient chain organisation and coordination. On the one hand, the panel

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1.   Little is known about costs and returns of organic vs. conventional milk production in Portugal. Available studies for the UE-15 aggregate (European Commission, 2009) and individual countries like Denmark (Morisset and Gilbert, 2000), the United Kingdom (Organic Centre Wales, 2006), Spain (Perez Mendez and Alvarez Pinilla, 2008) and the United States (McBride and Greene, 2007), indicate that costs are higher for organic production than for conventional, whereas milk yields are lower. The higher costs appear to be due to higher feed costs, higher labour costs, higher herd replacement costs and higher transaction costs. This partly explains the need for appropriate price premium to offset these higher costs.

argues that demand will increase gradually as consumers increase their use of the Internet to purchase goods and services. On the other hand, there is a special focus on the need to efficient use of ICT to implement best, sustainable management practices. Another relevant issue raised underlines the central role of certification and labelling for providing credibility to organic claims, ensuring consumer trust, reducing information asymmetry and lowering transaction costs.

4. Concluding remarks

The Portuguese dairy sector is experiencing a restructuring process aiming at facing new societal and market conditions driven by changing consumption patterns, sustainability requirements, innovation needs, and changing bargaining power along the food supply chain. Recent EU and national agri-food policies have been pushing this sector to adopt new production and marketing practices. In the long term, the sector will have to cope with the phasing out of EU quota regime by 2015, a new EU agro-monetary scenario after 2013, and the push for further market liberalisation in the WTO Doha Round trade negotiations.

Although these challenges present difficulties they also could bring about opportunities for the Portuguese dairy industry. OMP constitutes the most profitable, rapidly growing segment in this overall mature market. The market for these products should be developed essentially from two interrelated perspectives: supply chain sustainable management and demand-oriented strategies. Business competitiveness should be based on an appropriate mix of economic, societal and environmental criteria.

The results of this study indicate that the number of OMP consumers and consumption levels in Portugal might grow significantly over the coming years, especially if more information will be available and prices will remain relatively controlled. Similarly, an increase is expected in the role of health, nutrition and environmental factors as major drivers of food consumption. In this context, a suitable communication and promotion program focused on extra quality values of OMP will be highly beneficial for enhancing demand. This would be particularly pertinent because, as shown, there exist among Portuguese consumers widespread lack of knowledge and conceptual distortions about the organic notion.

Results also seem to outline a future scenario in which Portugal will not be capable to produce sufficient organic milk to satisfy its domestic demand, even though increased interest and investment in this segment is expected. Therefore, it will be necessary to continue resorting to foreign organic milk suppliers. Spain, France and Italy would be relevant options.

Finally, it is worth noting that the results of this exploratory study should inspire further investigation into a series of relevant aspects such as organic milk relative production costs and returns, production conversion costs, supply contract arrangements, benchmarking plans for best practices, certification and labelling schemes, consumer trust and communication policies, organic traceability, price premiums and incentive systems. A structured data gathering at different chain stages (farms, industry, distribution, consumers) also is required to develop a comprehensive database allowing for long-term analysis and monitoring of this small but complex market.

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