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The role of modern retailers to ensure quality in the food sector: the case of organic strawberry consumption in Italy¹

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Abstract: Major changes have occurred in the agri-food sector, generating new and more complex concepts of food quality. One of the most significant indicators of these changes is market restructuring, in terms of rapid concentration among retailers, the dominance of chain stores and their imposition of cost and quality constraints. Retailers currently play a more important role in ensuring food product quality and safety than public authorities.

To analyze this new aspect in the food sector, we carried out a survey on organic strawberry consumption in Italy. This segment of the organic sector is particularly interesting because the conventional strawberry may be considered an unsafe product due to the large use of chemical inputs in the production process. Nevertheless, the demand for organic strawberries demand is fairly low. We attempted to investigate such concerns through a questionnaire-based survey submitted to a representative sample of 318 Italian households. The questionnaire was structured into three areas of information to collect data related to consumer preferences for different characteristics of organic strawberries and psychometric and socio-economic variables. The data were analyzed using a Logit model to derive a demand estimate for organic strawberries. Our first results indicate the presence of a major role played by modern retailers and consumer lifestyles to drive the final demand of high-quality and safe food products.

Keywords: food quality and food safety; organic strawberry consumption; modern retail; Logit model.

1. Introduction

The agri-food sector in recent years has experienced major changes and the concept of food quality has taken on a very different meaning. An important indicator of such changes is market restructuring: there has been rapid concentration among retailers and chain stores have become dominant, imposing their cost and quality constraints ^[4;12]. Retailers are currently believed to play a more important role in ensuring food product quality and safety than public authorities.

To analyze this new aspect in the food sector, we carried out a survey on organic strawberry consumption in Italy. The choice of this product stems from the fact that strawberries represent for Italian consumers the very essence of fruit: they possess a series of both aesthetic and organoleptic properties such as to make the fruit particularly desirable. Awareness of this fact may well have made a major contribution to the expansion of strawberry farming in recent years. However, conventional strawberry farming is notable for its intensive use of chemical inputs. Consequently, the standard product may be viewed as unsafe, which makes the segment of organic production particularly interesting. Moreover, as is specified in the sections below, cultivation of organic strawberries is of appreciable importance for several agricultural areas in Italy both in terms of acreage and income. Nevertheless, the demand for organic strawberries is still fairly low ^[2]. In addition, Italian production faces the competitiveness of the product from other

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countries, whether European, such as Spain^[9], or non-European such as Latin American countries where, due to particularly favorable agroclimatic conditions, the strawberry crop is year-round, while in Italy it is a seasonal crop^[15]. Since a low supply level and inaccurate information about the differences between the organic and conventional product are among the most reliable determinants of organic strawberry consumption, we attempted to investigate such concerns through a questionnaire-based survey. The aim was to highlight which variables may play a major role in strawberry consumption^[14] and hence draw some implications for the expansion of this sector in Italy. For this purpose, our analysis envisaged two distinct phases. The first consisted in exploratory analysis of the different variables so as to highlight how they are distributed in the sample and obtain preliminary information on their reciprocal importance in determining consumer purchase behavior. The second consisted in using a Logit model to derive a demand estimate for organic strawberries. In the following sections we illustrate the results obtained. The last section is devoted to drawing some conclusions.

2. National consumer survey

2.1 General aspects of the analysis

Of fundamental importance for defining our approach were the findings from previous studies both on the characteristics of the organic strawberry production chain in Italy and on the consumption characteristics of organic products in general^[3;5;13]. As regards the first point, to date there is no reliable system of data collection for the organic sector across the various regions of Italy. This is evident from existing discrepancies among the various statistical sources as regards acreage under strawberry cultivation. According to FederBio² (2006), organic strawberry crops account for little more than 64 hectares, of which 50% is in Emilia Romagna, 9.4% in Sicily, 8.7% in Piedmont, 7% in Puglia and 6.4% in Veneto. However, according to SINAB³, in 2007, the area used for this crop was 131 hectares, which is more credible than the previous acreage. That said, the crop is concentrated within a few regions: in the north in Emilia Romagna, Piedmont and Veneto, in the south in two important farming areas in Sicily and in the Metaponto plain in Basilicata. Strawberry farming is substantially affected by the crop environment, which is why the various strawberry growing areas in Italy, with their different soils and climates, have their own variety standards.

Organic strawberry farming techniques, such as crop rotation, green manuring and application of organic matter or humus, incur fairly high production costs compared with the conventional system. From estimates made by crossing information on the area harvested in the various farms with data from SINAB, organic strawberry production in Italy is slightly over 3,000 tons (3013) of which about 1000 is produced in the north, 1500 in the south and islands and 500 in central Italy. Currently, few fruit-growers find it profitable to grow organic strawberries, most notably those with expertise who have over time perfected farming techniques and adopted beneficial labor strategies; those with the capital required to undertake the necessary investments; those able to maintain harvest percentages for industry below 15-25%; those able to organize high-quality certified product sales even for small quantities^[1].

The organic strawberry market is adversely affected by problems tied to various factors. These include high production costs often matched by fairly low retail prices, as well as major shortcomings in marketing logistics. The only logistical platforms of a certain interest are Apofruit Italia and Apo Conerpo, both headquartered in Emilia Romagna. Apofruit currently groups together 44 farms with 16 hectares under organic strawberry production, thanks to the increase in sales both on the domestic market and abroad with the Almaverde Bio⁴ brand (the only private brand in Italy not belonging to the large distribution chains but found in their outlets, which market the organic strawberry). The retail price of organic strawberries sold by the Apofruit group ranges from about 3.50 €/kg to 4 €/kg, with peaks for early produce (4.70 €/kg) and lower values (2.50 €/kg) in June, when the market is completely saturated.

² FederBio is the Italian Federation of Organic and Biodynamic Farming (Federazione Italiana Agricoltura Biologica e Biodinamica). It was established in 1992 with the aim of constituting a single representative body to safeguard and promote organic and biodynamic farming.

³ SINAB is the National Organic Farming Information System (Sistema di Informazione Nazionale sull'Agricoltura Biologica) set up by the Ministry of Agricultural, Food and Forestry Policy in collaboration with the regional authorities.

⁴ The brand Almaverde Bio actually embraces the following firms: Besana, Ca'Nova, Fileni, Fruttage, Novissime, Oranfrizer, Organic oils, S.I.P.O., Zanellini.

In the same period, the price of the conventional product varies, on average, between 1.15 (in full season) and 2.25 €/kg -2.30 €/kg for early produce.

The scarce presence of logistical platforms in Italy means that part of the organic strawberry crop is sold as conventional (25-30% of the product). However, the entry into the organic sector of large distributors, which account for about 50% of strawberry production in Italy, has various effects on consumers and producers. While it has reduced the price differential between the conventional and organic product, it has led to a concentration of demand, considerably reducing the margins for negotiation. Suffice it to think that in Italy, unlike what occurs on foreign markets, all the producers who supply the large chains (especially COOP and Esselunga) have to forgo their own brand.

The domestic market, excluding large distribution chains, absorbs only small quantities of the product (about 15%) earmarked, in particular, for catering (organic canteens). The remaining 35% is exported. The main importer, as for the conventional product, is Germany. However, the increase in acreage under strawberry in Italy combined with the increase in competition from abroad, especially Spain, has led to a downsizing of commercial flows, albeit in the presence of interesting market outlets in new countries such as the UK. Given this context, the domestic market clearly needs strengthening, with the emphasis both on benefits conferred by the proximity of production and on improvement of the end product, a key element in consumer choice.

Let us now move onto the market's main strengths and weaknesses. Undoubtedly, organic produce experiences much stiffer competition from conventional produce (much cheaper) than the integrated product. The latter especially provides, in the eyes of the consumer, the same guarantees to safeguard the environment and human health, combined with the additional benefit of a lower price ^[6]. Together with fluctuations in production and price, this leads the overwhelming majority of Italian strawberry-growers not to adopt organic farming techniques. Rather, there have been more than a few cases in which organic strawberry-growers have replaced strawberries with low-income crops which enjoy greater stability (such as salad crops).

Significant structural weaknesses also emerged from a survey carried out on organic strawberry-growers in Calabria. Despite enjoying one of the most specialized production bases in Italy, the growers encounter considerable difficulty in the transition to organic farming techniques due to the scarcity of experts able to flank them during the first few years of conversion. Moreover, absence of a local organic market forces them to seek connectivity with the national organic circuit. Failure to do so means giving up the premium price recognized for organic produce. Their production is marketed through Apofruit in Cesena which enables them to obtain a price differential of between 50 and 70% against the conventional product, depending on market conditions.

2.2 Sampling and questionnaire structure

The field survey was conducted by means of a questionnaire administered telephonically to a sample consisting of 318 consumers⁵ resident in various regions of Italy. To enhance the reliability of the results we chose, as an eligibility criterion, only those responsible purchasing food products. The questionnaire was administered to those who, when asked "*Do you buy strawberries?*", responded positively. Structured into 24 questions, it comprises three areas of information. The first was designed to reveal the strawberry purchase and consumption habits, especially focusing on consumer preferences vis-à-vis the main intrinsic and extrinsic attributes of the product. The second was designed to analyze the competitive ranking of the various types of strawberries and identify possible strategic tools to increase demand for the certified product. The third section aimed to place the Italian consumer of organic strawberries within a cultural and socio-economic framework by gathering data on age, education, profession, family members, income and lifestyle. The questions were multiple choice and for particular variables we used Likert scales 1-7⁶. Analysis was conducted in two phases: the first consisted in an explorative analysis of the information gathered; by contrast, the second used the results obtained to then implement a Logit model to estimate organic strawberry demand.

⁵ The telephone numbers were chosen by using national directories of subscribers identified by drawing a set of random numbers (about 400). The survey took place in the period between June and July 2008. The interviews were conducted on various days of the week and in different time slices.

⁶ With 1 corresponding to *not at all important* and 7 to *very important*.

2.3 Results of the explorative analysis

In terms of socio-demographic characteristics, it is women who chiefly take charge of food shopping, accounting for as many as 84% of interviewees, while the age classes which have the greatest concentrations are those between 31 and 50 (38%), and over 50 (32%). As regards marital status, 63% of the sample are married, against 7% single. Many of the nuclear families (42%) consist of four to six members, while over 38% have at most three members. In 60% of cases there are no children below the age of 10, while infants are found in 23% of cases.

With regard to the features of the sample that might be termed cultural and/or professional, only 4% have a university degree, and lower secondary school and higher secondary school leavers account for roughly equal percentages (40%). In terms of monthly net income, there is a considerable concentration (36%) in the classes between €1000 and 3000 while 26% state they can count on more than €3000.

As regards purchase and consumption habits, habitual purchase of strawberries concerns only 18% of the sample and the same percentage state they do not consume this product at all, while 47% sometimes consume them and 17% rarely. For those for whom consumption of the product is most important, purchase takes place in the period in which the product is found on the market and occurs almost weekly. Of the various forms of distribution, the most commonly used channel is confirmed to be that of large distribution chains (48% of purchases), followed by the small retailer (30%) and by the local market (20%). Few consumers state they purchase the product directly at the farmgate (figure 1).

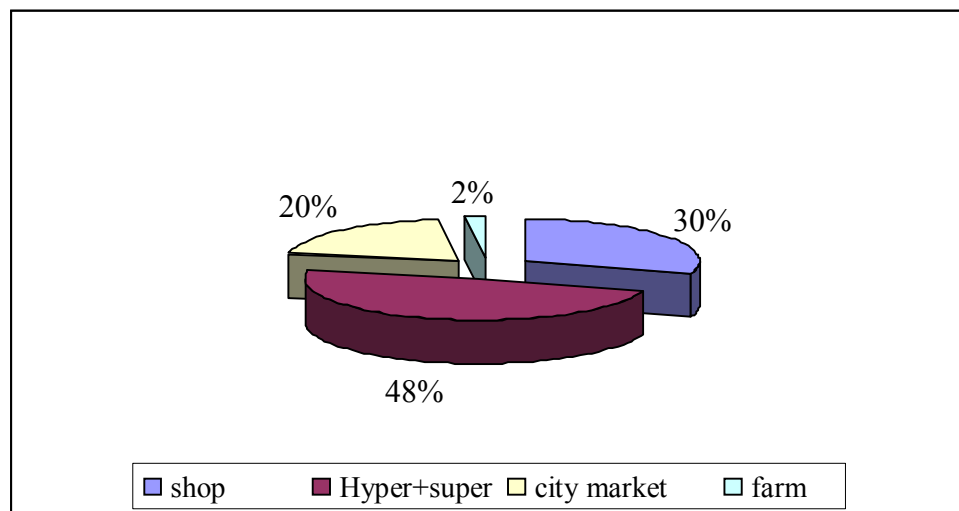


Figure 1. Sample breakdown by strawberry purchase location

Using a Likert scale from 1 to 7 to record consumption preferences regarding the main intrinsic and extrinsic attributes of strawberries, the most preferred characteristics proved to be taste, quality certification, Italian origin, and biodegradable packaging. A high score was also attributed to all the intrinsic characteristics such as smell, appearance, color and degree of ripeness. Lower scores were given to credence attributes such as the country of origin of the integrated or organic farming product. Of the 318 interviewees, 38% stated they had purchased organic strawberries in the month prior to the interview, 3% those from integrated farming. In both cases, the large distributors were preferred. Indeed, as many as 67% of the interviewees, on being asked: “*where do you buy organic or integrated strawberries?*”, stated they bought them in hyper- or supermarkets. Only 16% preferred the small retailer, 10% city markets while the short filière plays a marginal role (7%) (figure 2).

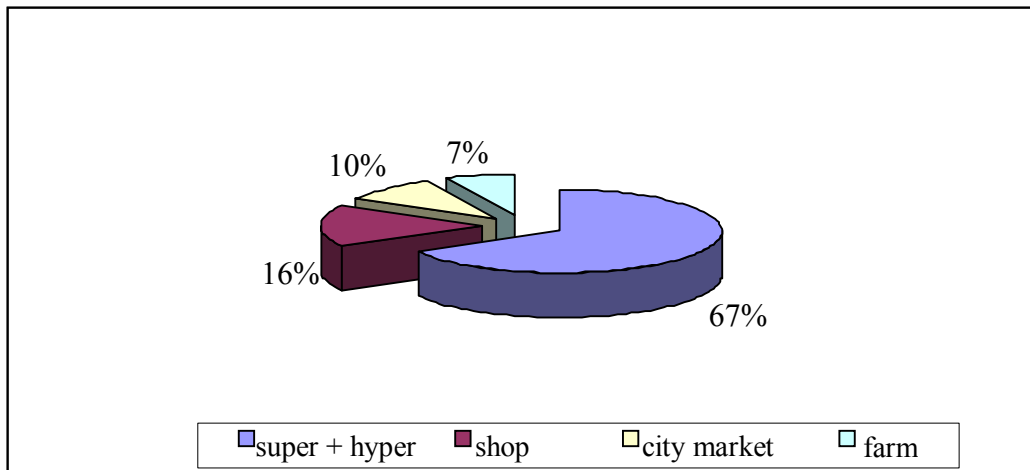


Figure 2. Sample breakdown by organic and integrated strawberry purchase location

The choice of large distributors as a preferred channel is conditioned by several variables, the main ones being a significant importance attributed to ensuring greater controls on products, the possibility of having more information on product characteristics and brand confidence. An interesting result is that concerning the information source in question. For consumers who purchased organic and integrated farming strawberries (41% of the sample), the distinction between the two types occurs mainly (85%) on the basis of labeling and for 12% thanks to leaflets available in the retail outlet. Of the 130 interviewees who purchased organic or integrated farming strawberries, 55% revealed the presence of children under 10 years of age in their nuclear family and also preferred organic products when it came to buying jam, biscuits for milk, spreadable paste, fruit juices, and so forth.

Given that the consumption of organic products is generally associated to particular lifestyles, the questionnaire contained several related questions. Interviewees were asked to indicate to what extent they agreed⁷ with the statements listed in table 1. From the average scores it may be inferred that the interviewees pay great attention to country of origin of foodstuffs, closely correlating this factor with product safety. This aspect is of great importance: attention to health and the quality of food consumed was given high scores, similar to those of origin. There also emerges a certain importance attached to fruit and vegetable seasonality, traditions and loyalty to a specific distribution chain.

⁷ According to a Likert scale where 1 = *strongly disagree* and 7 = *strongly agree*.

Table 1 – Importance of some general concepts

“I see myself as a person”	Average score Scale from 1 to 7	Standard deviation
who adopts actions that may lead to a fairer world	4.7	1.3
who is personally committed to actions that may improve the quality of the environment	5.0	1.5
who is sensitive to social inequity	5.4	0.7
who is loyal to a specific distribution chain (Coop, Carrefour, Auchan, Conad etc.)	5.9	1.2
who is environmentally aware	6.3	0.7
who appreciates all that is natural	6.5	0.7
who believes traditions are important	6.6	0.8
with an active lifestyle	6.6	0.7
who is attentive to the seasonality of fruit and vegetables	6.7	0.7
who is very attentive to the quality of food purchased	6.8	0.4
who is family-oriented	6.8	0.5
who is health-conscious	6.9	0.4
who is very attentive to value for money of the goods I buy	6.9	0.4
who is very attentive to the country of origin of the food products I buy	6.9	0.3

Finally, to find out the level of information, credence and motivations behind the purchase of organic products, we used questions requiring *yes/no/don't know* answers. Of the 172 interviewees (54% of the sample) who responded, all pointed to the need for ministerial certification for organic produce, but only slightly more than half knew the difference between organic and integrated farming. Although most of the interviewees felt the information available on organic products was not clear, knowledge of their characteristics was sufficient. Of the various sources of information, great confidence is laid in information campaigns, in consumer associations and in environmental organizations, as well as in information gathered at specialized retail outlets or directly from the farm concerned. By contrast, information disseminated by public authorities or by the television and internet enjoys a lower degree of confidence. Lastly, some questions were asked to identify the strategic tools to boost organic strawberry consumption (table 2).

Table 2 – Importance of various strategic tools

Questions	Average score Scale from 1 to 7	Standard deviation
Clearer certification with greater guarantees	7.0	0.2
Origin in the production area closest to my home	6.5	0.8
Better taste	6.3	0.9
Lower price	5.2	1.1

Source: our elaboration of survey data

Clearer and better defined certification emerged as the main tool on which to act, followed by proximity to the production zone. A better taste and lower price would appear less incisive marketing tools.

3. The econometric model: estimates and results

Binary choice models are known to assume that individuals make a choice between two possible alternatives, influenced by socio-economic or psychographic characteristics^[11]. If we know the attributes of the subjects involved, it becomes straightforward to estimate an equation that can predict the choice made individuals of a population. The prime objective of such modeling is to determine the probability of a given individual, characterized by known explanatory variables, making one choice rather than another. One approach consists in logit models, where it is assumed that there is a latent response variable y_i^* defined by the following relation:

$$y_i^* = \beta' x_i + u_i$$

In practice, y_i^* is not observable and will supply in the following models the point of contact with Random Utility Theory. Instead, the observable variable is represented by a dichotomous y which assumes the following values:

$$\begin{aligned} y &= 1 && \text{if } y_i^* > 0 \\ y &= 0 && \text{otherwise} \end{aligned}$$

In this model $\beta' x_i$ is equal to $E(y_i^* | x_i)$. In probabilistic terms, we have:

$$\begin{aligned} \text{Prob}(y_i=1) &= \text{Prob}(u_i > -\beta' x_i) \\ &= 1 - F(-\beta' x_i) \end{aligned}$$

where F is the empirical distribution function of u .

In this case the observed values of y are the realizations of a binomial with probabilities dependent on x_i . The functional form for F will depend on the assumptions made for u_i which, in the case of organic strawberry demand estimation, was assumed logistical:

$$\begin{aligned} F(-\beta' x_i) &= \frac{\exp(-\beta' x_i)}{1 + \exp(-\beta' x_i)} = \frac{1}{1 + \exp(\beta' x_i)} \\ 1 - F(-\beta' x_i) &= \frac{\exp(\beta' x_i)}{1 + \exp(\beta' x_i)} \end{aligned}$$

In the statistical model implemented, we considered 255 individuals out of 318, given that the remaining part returned a questionnaire which was not sufficiently complete for insertion in the analysis.

Taking account of the variables deriving from the various areas of information into which the questionnaire was divided, it was possible to formalize the following empirical model:

$$\text{BOS}_i = \beta'_{\text{Kids}} \text{Kids}_i + \beta'_{\text{Fam_n}} \text{Fam_n}_i + \beta'_{\text{Nat}} \text{Nat}_i + \beta'_{\text{Ret}} \text{Ret}_i + \beta'_{\text{Seas}} \text{Seas}_i + u_i$$

$i = 1, 2, \dots, 255$

In this specification, i is the index relative to the 255 individuals making up the sample; **BOS** _{i} is the dependent variable which expresses the purchase of organic strawberries made by the consumer (BOS= 1 if the consumer has purchased organic strawberries; 0 otherwise); **Kids** _{i} , **Fam_n** _{i} , **Nat** _{i} , **Ret** _{i} , **Seas** _{i} are

column vectors which describe respectively the presence of children in the nuclear family (Kids_i for which the value 1 was used to indicate the presence of children, 0 the absence), the number of family members (Fam_n_i whose value indicated by each individual ranges from 1 to 6), respect for the environment (Nat_i for which a 7-level Likert scale was used in which 1 stood for *not at all important* and 7 *very important*, the preferred distribution channel (Ret_i = 1 if he/she purchased in a large distribution chain; 0 otherwise), and finally the importance of food seasonality (the variable Seas_i for which the 1-7 Likert scale was always used). The model variables (Table 3) were all in agreement sign-wise with the expected impact.

The significance of the model was verified with the Likelihood Ratio Test. The model's goodness-of-fit was verified with the Count R-squared index (0.73).

Table 3 – Results of the econometric model

Variables	Coefficient	z – Statistic	Prob.
Kids	0.769	4.363	0.000
Fam_n	0.240	1.791	0.073
C	-11.609	-4.764	0.000
Nat	0.634	2.913	0.003
Ret	0.464	3.311	0.000
Seas	0.408	1.502	0.133

Total obs	255
Obs with Dep=0	125
Obs with Dep=1	130

Interpretation of the results obtained with the aid of the econometric model leads to some interesting observations. The dependent variable considered in the statistical analysis allowed us to divide the sample into two groups. As regards purchase of organic strawberries, 49% of individuals (125 interviewees) responded negatively while the remaining part (130 interviewees) acquired the product. The presence of children in the nuclear family and particular attention to lifestyle naturalness were variables that most affected the purchase choice of organic strawberries. The third variable in order of importance was the purchase channel which in this case consisted of large distribution organizations. One parameter which agrees sign-wise with expectations but was characterized by marginal significance was the importance attributed to food product seasonality.

Concluding considerations

Driven by various demand components, the organic farming sector has experienced major changes in time. What has played a particularly important role is both the greater attention paid by end consumers to food product quality and the role played by distribution in mediating needs expressed by the consumer^[7;8;10]. This process has been accompanied and, in some ways, shaped by a changing regulatory framework, which is increasingly rigorous and attentive to food safety and hence has become stricter for organic production as well. Since the 1990s, interest in the sector on the part of institutions has become more intense, partly to ensure homogeneity in defining production techniques and create an efficient control system to avoid fraudulent behavior on the part of producers. Legislation has thus become more thorough and complex, but there have also been major support schemes designing concrete action for sector development. In Italy this led to an initially chaotic sector development phase chiefly aimed at crops that already by tradition had production methods that were very close to organic methods and to rapid growth of the number of firms and acreage.

Subsequently, faced with a situation of higher production costs and significant difficulties in obtaining a suitable premium price, in 2001 a restructuring process started which is yet to be completed. This process basically consists of a trend towards a more balanced area distribution, besides a more structured, mature sector. While the phases of processing and marketing have substantially held up, which indicates the sector's stability and maturity, the production phase is experiencing intense structural reorganization. Indeed, while the number of operators has decreased, the growing average size of firms suggests that marginal firms have left the production circuit. This trend is confirmed by the appreciable increase in

production and processing firms. Further, while acreage has decreased overall, the largest decrease has been observed in farms converting to organic. This has resulted in a stronger production chain which is extremely market-oriented. Compared with the past, the sector is more mature, business-oriented and less inspired by ideals. In the meantime, also in terms of commercial distribution there has been a certain dynamicity: the role of the large distributors has been consolidated, whose strategies based on private production standards appear to have structured agri-food production chains in a new way.

However, consumption of organic fruit and vegetables, especially the production and consumption of organic strawberries, appears somewhat limited. The most significant elements emerging from our analysis may be summarized in three points. First, there is the important question of product availability, with many consumers stating the difficulty in finding certain categories of organic products in the most visited retail outlet. This implies the need for greater uniformity of product distribution among the various distribution segments. A second aspect concerns the visibility of organic products. Given that quality certification increases the consumer's ability to assess food properties from the moment of purchase, but it is not tied to any of the intrinsic aspects of the product, the communication strategies implemented by firms should concentrate on adopting instruments able to enhance the visibility of quality characteristics associated to organic produce. This may be achieved by setting up a more transparent system of labeling. It is precisely within this scenario that the problem of organic strawberry consumption lies: despite being a very sensitive fruit, it entails the implementation of a fairly simple production process.

Finally, a third possible consideration arising from the survey results concerns the role played by information as a determinant of organic product purchase. Fifteen years on from the introduction of organic certification in the EU, the level of confusion displayed by consumers concerning this product class is still very high: about half the sample does not know whether there is a difference between products from integrated or organic farming, while an even higher percentage confuses organic with macrobiotic products. Unfortunately, those who stated they purchased organic products, albeit convinced of this, may well have bought a different product, most likely belonging to the "*environmentally friendly*" class, but not necessarily organic. This critical point, highlighted by various authors in the past, still appears very relevant, partly due to the persistent lack of an information policy that might give not only a brief description of organic products, as occurred in the past, but also be able to illustrate to consumers the differences between the various products of low-impact farming.

In a dynamic perspective, targeted information campaigns can play a decisive role in increasing consumption in Italy. Such campaigns should focus on occasional consumers who have not yet built up a strong motivational involvement for organic products and might, in the absence of purchase stimuli, not increase their consumption of such products or, in a negative perspective, turn to other product types that meet their consumption needs.

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