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The Role of Consumer Acceptance in the Food Innovation Process: Young Consumer Perception of Functional Foods in Italy

Teresa Del Giudice[1], Stefano Pascucci [2]

[1]*University of Naples Federico II, Italy, and Centro per la Formazione in Economia e Politica dello Sviluppo Rurale – Portici, Italy*

[2]*University of Naples Federico II, Italy, and Wageningen University, The Netherlands*

[1]*agriqual@unina.it,* [2]*stpascuc@unina.it*

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ABSTRACT

This paper analysed the factors influencing the acceptance of functional foods (FFs) of three distinct groups of young Italian consumers. We implemented an ordered probit model based on data collected in a field survey carried out in southern Italy in 2008. The results showed that different sources of information and knowledge (e.g. the internet, newspapers and universities), judgements and motivations (e.g. taste and health effects credibility) are key elements in the acceptance of FFs. This implies the need to identify highly differentiated communication and marketing strategies for both public agencies and private firms in order to promote FF consumption.

Keywords: functional foods, consumer acceptance, ordered probit, Italy

1 Introduction

Functional Foods (FFs) represent one of the most interesting areas of research and innovation in the food industry (Schaafsma, Kok, 2005; Jones, Jew, 2007; Doyon, Labrecque, 2008; Sirò et al., 2008). Like many food innovations FFs are following a cycle which is led by two driving factors: on the one hand there is the "technology-push" dynamic which implies a strong technological and know-how transfer from other sectors; on the other, the "demand-pull effects" which are dependent upon consumer acceptance of new products (Grunert et al., 1997; Mark-Herbert, 2002). Thus the capacity of a firm to transform a technological adoption into a real innovation is highly conditioned by effective market response. Food firms interested in using innovativeness as a competitive strategy have to constantly analyse the change in their target-consumer perceptions, tastes and preferences (van Trijp, Steenkamp, 2005).

In Italy, although FFs are becoming increasingly popular, with rosy forecasts of their future development and demand, there is still little understanding of how these foods are perceived by consumers and how the demand is segmented. In order to increase the chances of success in this market a food firm cannot afford not to broaden its knowledge on function food consumer perception, the cultural, psychological and social motivations under which the consumer behaves (Urala, Lähteenmäki, 2003; Sirò et al., 2008). It is important to recognise that consumers accept new products in different ways, and often the same product is viewed antithetically by two distinct groups of consumers (Verbeke, 2005). This holds particularly in the case of FFs which are characterized by complex technological and marketing features (Doyon, Labrecque, 2008; Sirò et al., 2008). In this perspective FFs are still very risky as new products frequently fail a few years after their introduction onto the market (Mark-Herbert, 2003).

In this paper we analysed the preferences for FFs of three groups of Italian young consumers with different "knowledge backgrounds". In the presence of complex technological characteristics the choice of credence goods such as FFs could be strongly conditioned by the capacity of consumers to elaborate and

frame information according both to their reasoning (knowledge) and their intuition system (perceptions) (Kahneman, 2003). In less experienced consumers this could be even more relevant. In order to analyze different perceptions and knowledge endowments about FFs a field survey was organised using a questionnaire to obtain all the information related to FF consumption. On the basis of the work of Urala, Lähteenmäki (2003) eight main descriptors were selected which could be related to the main statements which the potential consumer could give according to his/her preferences in a range of judgements from 1 to 7 (Likert scale). The descriptors give us the opportunity to indicate the main aspects related to functional food consumption such as customer satisfaction, familiarity with the product, consumer needs, perception of functional food as a drug, consumer diet, food risk, tastes and price.

The paper is organized as follows: in section 2 a brief overview of the relevant literature on FFs consumption behaviour is provided. In section 3 we present our conceptual framework while in section 4 and 5 data description and empirical results are showed and commented. In the final section we discus the main outcomes of the research and prospect some interventions both for public agencies and private firms.

2 Literature review on consumer acceptance of FFs

Present-day marketing of food products focuses decidedly on the health implications of their consumption (Schaafsma, Kok, 2005). Along with Americans and Japanese, European consumers are well aware that, together with physical exercise, a proper dietary regime is the most important factor for maintaining a satisfactory state of health (Bech-Larsen, Scholderer, 2007; IFIC, 2007). Demographic trends and socio-economic changes also make it necessary to have access to foods endowed with more beneficial properties (Sirò et al, 2008).

The increase in life expectancy, which has led to an increase in the number of elderly people and to a desire for an improved quality of life, and the consequent rise in health care costs have driven politicians, researchers, health care professionals and the food industry to seek a way to manage such changes more effectively (Jones, Jew, 2007). In Western societies the perception of food as a nutrient is now flanked, if not overtaken, by that of food as a promoter of well-being. FFs represent one of the most interesting responses that the food industry can supply to the demand for health tied to food consumption (Jones, Jew, 2007).

While the issues concerning the legal aspects and definition of characteristics that go to make up a functional food are still under discussion, and are likely to be for some time, this sector has seen an increase in sales in all industrialised countries. In Europe the release of functional products onto the market has been a major novelty. The dairy sector has been radically changed by the introduction of probiotics, but also for oven-baked products, soft drinks and baby foods the number of new products launched is considerable, even if the failure rate remains high (Sirò et al., 2008).

Annual research conducted by the IFIC since 1996 (IFIC, 2002; 2005; 2007) through focus groups and telephone interviews shows that demand for FFs continues to rise (Schmidt, 2000; Sirò et al., 2008). This positive trend is also observed in Italy and Europe as a whole, where consumers are increasingly determined to look after themselves without resorting to the use of medicine (Soldi, 2007). The global market was estimated at around US$ 32 billion in 2002 and has risen constantly given that new FFs are frequently launched (Urala, Lähteenmäki, 2003). However, the distribution and spread of FFs is still very uneven among European countries and often -within individual countries. In 2003 the market for FFs in Italy concerned chiefly drinks, oven-baked products, snacks and dairy products.

Although the statistics and FF consumption trends confirm how important and popular they are becoming and all the future predictions of their development and market growth are extremely positive, further investigations are needed to know how they are perceived by different consumer types. To enhance the potential in this growing market it is logical to think that the industry should really know the reasons that drive consumers to choose FFs, how they justify their choice, and to what extent their interest is tied to their values and their basic culture (Urala, Lähteenmäki, 2003). Consumers accept new products in different ways, and the same product is very often perceived in opposite ways by two distinct categories of consumers (Verbeke, 2005). Moreover, the sale of some products very often stops a year after their release onto the market (Mark-Herbert, 2003).

Hence, to be able to develop such products in the future, the research of marketing experts is essential and constitutes the starting-point for food companies which must invest in launching new products. In this regard, the questions to be addressed are related to how FFs are officially defined, how they are perceived by different consumers and what driving factors affect those perceptions.

Recently FFs have been defined as a food marketed with an added, technologically developed ingredient with a specific benefit (Niva, 2007; Sirò et al., 2008). However, a glance at the literature on FFs shows straightaway that this concept has rapidly extended in recent years and consumers have had little time to gain familiarity with the phenomenon. FFs started in Japan with the undeclared aim of cushioning the health costs arising from the large percentage of elderly people among the population (Hardy, 2000). In Europe, FFs have not yet attained a precise definition within European law. Thus we may consider the definition coined by the European Food Information Council (EUFIC) still valid: "*generally, they are considered as those foods which are intended to be consumed as part of the normal diet and that contain biologically active components which offer the potential of enhanced health or reduced risk of disease*" (http://www.eufic.org/article/en/expid/basics-functional-foods, 2009). We decided also to refer to an operational definition of FFs given by a recent work of Doyon and Labrecque (2008) based on a review of the literature and the Delphi technique with a group of North American and European experts: "*A functional food is, or appears similar to, a conventional food. It is part of a standard diet and is consumed on a regular basis, in normal quantities. It has proven health benefits that reduce the risk of specific chronic diseases or ill states in addition to its basic nutritional functions*".

According to these definitions FFs must remain foods and must show their effects if consumed within a diet in quantities which are considered normal. The mechanisms through which a functional food may model definite functions to contribute to maintain the state of health, must be scientifically demonstrated and supported by epidemiological data which prove the statistical validity of the positive effect. Such foods must be consumed as an integral part of a normal food regime and the effects are obtained by consuming the same quantities thereof as those envisaged by a common diet. FFs must thus be distinguished from *enriched* (or supplementary), *fortified*, *dietetic nutraceutical*, *supplements* and/or *traditional health* foods.

While waiting for clear-cut legislation to be enacted, however, there is no harm considering as functional all foods which promote well-being, although it is worth recalling that FFs claim to have a beneficial ingredient which, under normal and natural conditions, does not occur in the food product. We can summarize the main features of FFs as follows (Roberfroid, 2002; Doyon, Labrecque, 2008):

1 a conventional or everyday food;

2 consumed as part of the normal/usual diet;

3 composed of naturally occurring (as opposed to synthetic) components;

4 having a positive effect on target functions beyond nutritive value;

5 that may enhance well-being and health/or reduce the risk of disease or provide health benefit so as to improve the quality of life including physical, psychological and behavioural performance,

6 have authorized and scientifically based claims.

3 The conceptual framework and econometric model specification

Following the random utility framework in this study we assumed that a consumer faces a choice between accepting (*A*) and disapproving (*D*) the use of FFs. Utilities derived from accepting and disapproving FFs are given by U_A and U_D, respectively, which are not observable. The observable variables are judgement attributes *k* (*k = A, D*) and a vector of consumer characteristics (x).

The utility of consumer *i* is postulated as follows:

$$(1) \qquad U_{ki} = V_{ki} + \varepsilon_{ki},$$

where U_{ki} is the latent, unobserved utility for choice alternative *k*, V_{ki} is the explainable part of the latent utility that depends on the chosen process with attributes *k* and personal characteristics of consumer *i*, and ε_{ki} is the random or "unexplainable" component of the latent utility associated with the choice of product attribute *k* and consumer *i*.

Consumer *i*'s choice ordering between approval and disapproval of FFs (i.e., between attributes *A* and *D*, respectively) is modelled in the following way: consumer *i* ranks FFs in one of the j^{th} categories based on the indicator function:

$$(2) \qquad Zi = (Vai + \varepsilon ai) - (Vnai + \varepsilon Di) = (\varepsilon Ai - \varepsilon Di) - (VAi - VDi),$$

where Z_i can be interpreted as additional utility derived by the i^{th} consumer choosing to approve FFs over disapproval. The consumer expresses strong disapproval in FFs if Z_i is below some threshold value (e.g., μ_1), shows disapproval if Z_i is above $\mu 1$ but below another threshold value μ_2, and reveals approval in the process if Z_i is above μ_2. Formally, consumer i's choice ordering (denoted by Y_i) can be expressed as follows:

(3) $Y_i = 1$ if $Z_i \leq \mu_1$,

$Y_i = 2$ if $\mu_1 < Z_i < \mu_2$,

. . . ,

$Y_i = J$ if $Z_i > \mu_{j-1}$.

Since part of the utility is random in nature, a researcher cannot perfectly predict the choice of a consumer. From the researchers' perspective, the problem is inherently stochastic, which naturally leads to formulating the i^{th} consumer's choice problem in probability terms (where Y_i=1 implies strongly disapprove, $Y_i = 2$ disapprove, $Y_i = 3$ doubtful, $Y_i = 4$ approve and $Y_i = 5$ strongly approve):

(4) $P(Y_i = 0 \mid \text{Choice Set}) = P\,[Z_i = (\varepsilon_{Ai} - \varepsilon_{Di}) - (V_{Ai} - V_{Di}) < \mu_1]$

$P(Y_i = 1 \mid \text{Choice Set}) = P\,[\mu_1 < Z_i = (\varepsilon_{Ai} - \varepsilon_{Di}) - (V_{Ai} - V_{Di}) < \mu_2]$

$P(Y_i = 2 \mid \text{Choice Set}) = P\,[\mu_2 < Z_i = (\varepsilon_{Ai} - \varepsilon_{Di}) - (V_{Ai} - V_{Di}) < \mu_3]$

$P(Y_i = 3 \mid \text{Choice Set}) = P\,[\mu 3 < Z_i = (\varepsilon_{Ai} - \varepsilon_{Di}) - (V_{Ai} - V_{Di}) < \mu_4]$

$P(Y_i = 4 \mid \text{Choice Set}) = P\,[Z_i = (\varepsilon_{Ai} - \varepsilon_{Di}) - (V_{Ai} - V_{Di}) > \mu_4]$.

Under the assumption that the random term $(\varepsilon_{Ai} - \varepsilon_{Di})$ follows standard normal distribution, the above probabilistic model is estimated using the ordered probit model (Verbeek, 2008). In empirical estimation, the indicator Z_i for the i^{th} consumer is modelled as:

$$Z_i = \beta' X + \nu_i \text{ , with } i = 1, 2, \ldots, n,$$

where: X is the matrix of choice determinants; β the parameter vector to be estimated; and ν = random error or disturbance term. The ordered probit model is estimated using maximum likelihood.

In accordance with previous studies, it is assumed that approval of FFs has a strong utilitarian connotation as their usage should entail "expectations of consequences" (Batra, Ahtola, 1990). Previous studies also underlined how FFs are mainly perceived and processed by the reasoning part of our cognitive system given the huge amount of information embedded in such products (Verbeke, 2005). In this sense the knowledge endowments (skills, experiences, education) of the consumer should be considered *a priori* in understanding the choice of FFs. Even the name, functional, suggests the utilitarian connotation of such products.

On the other hand, we also believe that a number of FF features are not so clearly confined to the instrumental and rational domain of consumer cognitive processes. For example, including FFs in one's "everyday" diet without a clear medical prescription might involve some "positive" sensorial feelings, what Kahneman defines as perceptions belonging to intuitive judgements (Kahneman, 2003). It means that a "pleasure" component is also involved in the consumption of FFs and consumer choice is driven by a hedonic component as well. Many authors have stressed this component of FFs as their capacity to fulfil a more complex state of consumer "well-being", which also implies psychological and mental aspects (Menrad, 2003; Roberfroid, 2002; Niva, 2007; Sirò et al., 2008). In other words, consumers living in economically developed societies (i.e. Europe, Japan, the USA etc.) are much more aware of the connection between nutrition and state of health, which implies an overall well-being (physical and psychological) rather than only an absence of physical disease. For this reason FFs could assume also a strong hedonic dimension especially if they assume symbolic and identifying connotations for the consumer's psychology.

Table 1
Statements used to analyze young Italian consumer perceptions of FFs
Source: Questionnaire

General statement (descriptor)	Specific statements (judgments/perceptions)	Cognitive nature	Meaning in terms of Consumer Behaviour Theory
(a) Satisfaction	I experience pleasure eating FFs	Hedonic	It describes the degree of satisfaction deriving from the use of FFs. It includes statements that specifically reflect the strictly personal feelings and judgments of the consumer. The key point of this descriptor is that the usage of FFs could improve the consumer's health and performance, and constitute an effective way to look after oneself. Consumers who gave higher scores perceive greater satisfaction from using FFs than those with lower scores.
(b) Confidence and trust	Using FFs are completely safe	Utilitarian	The second descriptor concerns confidence in FFs and includes statements that describe consumer attitudes towards claims and information on the health effects of FFs. In other words, this descriptor seeks to understand to what extent individuals trust information and to what extent they believe in the scientific basis of the alleged health effects. What emerges from this descriptor is also how much they appreciate the advances that scientific research has made in recent years in the food sector. While FFs may be criticized from several angles, it is undeniably appealing to be able to isolate an ingredient from a food and insert it into another food without the risk of creating a genetically modified organism.
(c) Needs	For a healthy person FFs are useless	Utilitarian	The third descriptor concerns the needs for FFs and it describes how essential they are thought to be for themselves and for the population in general. This descriptor only describes the general need for FFs and makes no reference to any pathology. The usefulness of FFs also emerges thanks to the presence of negative statements, inserted with the same purpose: to make the consumer reflect and check his/her consistency.
(d) Health	I don't want to eat foods which have the same effects as medicine	Utilitarian	The fourth descriptor concerns FFs and medicine, and seeks to detect how far, in the collective imagination, they are viewed as surrogates for medicine, to what extent foods must always differ from drugs and whether these two categories may have the same fields of action.
(e) Diet	Regular assumption of FFs can prevent diseases caused by unhealthy diets	Utilitarian	The fifth descriptor is called *FFs as an important part of a healthy diet* and seeks to understand to what extent it is thought they can play a decisive role in building up an optimal state of health. What is emblematic here is the question concerning people who should be in better shape if, *ceteris paribus*, the only thing that distinguishes them is the frequency of their use of FFs. The people who responded with high scores believe that the use of FFs may afford protection against an unhealthy diet.
(f) Nutritional risk	Overloading new functional properties of foods could produce unpredictable risks	Utilitarian	The sixth descriptor concerns the absence of nutritional risk in FFs. This dimension describes the interviewees' suspicion of there being possible harmful effects in FFs which may also stem from their excessive use. If they think that the release onto the market of such foods has been extremely rapid, to ensure survival in an ever more competitive market, then they will think that this could lead to unforeseen risks. Those who gave higher scores think that there could be health risks.
(g) Taste	For FFs I'm ready to give up at least about some of their taste qualities	Hedonic	The seventh descriptor contains statements that explore the relationship between food flavour/taste and health effects, and describes how willing consumers are to give up the good flavour of a food if the latter is functional.
(h) Price	I'm willing to pay more for functional features, it is a matter of quality	Mix	The eighth and last descriptor explores the role of the cost of such products. It detects to what extent FFs are perceived as the most expensive in their categories (e.g. of all yogurts, functional yogurt is the most expensive), how much they are willing to pay and also how far they are willing to overlook price for ascertained product quality.

Table 2.
Descriptive statistics
Source: Field survey data

Variable name		Description	Type of variable	Value	
FFs Acceptance (Y)			*Discrete*	%	SD
Y	ACCEPT	Consumer acceptance statement	*0 = disapproved*	7.3	-
			1 = somewhat disapproved	56.7	-
			2 = somewhat approved	26.7	-
			3 = approved	9.3	-
	Judgments			Mean	SD
X_1	SATISF	I experience pleasure eating FFs		4.9	1.4
X_2	TRUST	Using FFs is completely safe	*Likert scale:*	4.3	1.7
X_3	NEED	FFs are a complete mystification	*1 = strongly disapproved*	2.7	1.5
X_4	HEALTH	I don't want to eat foods which have the same effects as medicine	*2 = disapproved*	3.6	2.2
X_5	DIET	Regular assumption of FFs can prevent diseases caused by unhealthy diets	*3 = moderately disapproved*	4.1	1.8
X_6	NUTRITIONAL RISK	Overloading new functional properties of foods could produce unpredictable risks	*4 = indifferent* *5 = moderately approved*	4.5	1.8
X_7	TASTE	For FFs I'm ready to give up at least about some of their taste qualities	*6 = approved*	3.3	1.8
X_8	PRICE	I'm willing to pay more for functional features, it is a matter of quality	*7 = strongly approved*	4.9	2.0
Consumer features					
X_9	GROUP	Group of consumers according to their knowledge endowment	1= Scientific background	0.33	0.47
			2 = Humanistic background	0.33	0.47
			3 = No specific background	0.33	0.47
X_{10}	AGE	Age	*Continuous*	26.55	3.44
X_{11}	GEN	Gender	*0 = Female 1 = Male*	0.50	0.50
X_{12}	INCOME_1	Household gross income 0 - 15,000 euro/year	*Dummy*	0.03	0.16
X_{13}	INCOME_2	Household gross income 15,000.01 - 28,000 euro/year	*Dummy*	0.26	0.44
X_{14}	INCOME_3	Household gross income 28,000.01 - 55,000 euro/year	*Dummy*	0.39	0.49
X_{15}	INCOME_4	Household gross income 55,000.01 - 75,000 euro/year	*Dummy*	0.25	0.44
X_{16}	INCOME_5	Household gross income > 75,000 euro/year	*Dummy*	0.07	0.26
	Context				
X_{17}	URBAN	Resident in an urban area	*Dummy*	0.79	0.41
	Information				
X_{18}	TV	Information related to FFs provided by Television	*Dummy*	0.54	0.50
X_{19}	NEWSP	Information related to FFs provided by Newspapers	*Dummy*	0.38	0.49
X_{20}	WEB	Information related to FFs provided by the Internet	*Dummy*	0.41	0.49
X_{21}	UNIV	Information related to FFs provided by Universities	*Dummy*	0.25	0.43
X_{22}	PUB_AG	Information related to FFs provided by Public Agencies	*Dummy*	0.21	0.41

4 Data source and description

This study used data collected in southern Italy in spring/summer 2008. A direct questionnaire survey was the method adopted to investigate the acceptance of a group of young consumers (under 35 years old) of FFs. A number of focus groups and preliminary interviews were organized during the set-up phase in order

to test its validity and effectiveness. On the basis of the judgements and evaluation we obtained, the questionnaire was modified several times. Abstruse terms which were uncommon in current Italian, such as "health claims" and "pharma food", were eliminated and replaced with other expressions which nonetheless rendered the concept.

The questionnaire was administered to three groups of 50 subjects each: consumers with a humanities background between 22 and 30 years old (average age: 25.14), consumers with a scientific background between 22 and 30 years old (average age: 25.58) and young employees between 25-35 years old without university degrees but with high-school diplomas (average age: 28.92). The sample was explicitly organized in order to be balanced in terms of gender differences in all the three groups of consumers. This choice was due to the need to minimise any gender potential bias and concentrate our analysis on perceptions and judgement differences.

Together with the questionnaire, so that they could be more familiar with the questions, consumers were shown some FFs "in the flesh", namely Actimel, Activia, Parmalat Jeunesse, Danacol, milk with omega-3 and Red Bull. The questionnaire was clearly separated into two parts: in the first warm-up part our interest was to capture the degree of sensitivity of the interviewees towards the subject of nutrition and well-being; in the second part the subject of FFs was tackled directly in order to highlight the hedonic rather than the utilitarian nature of perceptions and judgments related to FFs. We decided to use eight descriptors for FFs, in accordance with the study of Urala and Lähteenmäki (2004).

The descriptors were based around some statements: by applying a score from 1 to 7 (Likert scale) the interviewee indicated to what extent the statements were part of his/her thinking (Table1). Two of the eight descriptors assumed clear hedonic connotations (satisfaction and taste), while five of them assumed a more utilitarian significance (confidence and trust, needs, health, diet, nutritional risk). The price component could be considered as mixed since it assumed both connotations and significance. The proportion between the utilitarian and hedonic attributes of FFs was carefully checked and the warm-up phase with focus groups and preliminary interviews confirmed the prevalence of those elements in the perceptions and judgments of young consumers in southern Italy.

From the main characteristics of the sample (Table 2) it may be seen that 39% of the sample belonged to the middle income class with a gross annual income of 28,000 – 55,000 euro, while 26% of the consumers belonged to a household with a gross annual income of more than 15,000 and less than 28,000 euro and 25% showed a gross income from 55,000 to 75,000 euro per year. We use the same category used by the Italian Ministry of Finance to determine the taxation level of Italian households. About 79% of the interviewees lived in an urban area (mainly the city of Naples).

5 Empirical results

5.1 Descriptive analysis

From the first part of the interview we expected confirmation of general aspects which concern FFs: scant familiarity with the concept; confusion in appraising all the categories of novel food, hardly ever frequent consumption of such foods. The first part, with the aid of real foods which the interviewees could touch and, if they thought it appropriate, taste, was the most appealing and responded very well to the aim for which it was devised. What emerges from the first part of the survey is widespread knowledge of the new way of viewing diet, which may be summarised by the motto "eat to keep fit" and no longer just "eat to live". Of those interviewed, 87% (131 out of 150) felt they agreed with this new view of diet. Regarding the sources of information, related to FFs, the consumers showed a great variety in their answers: television (54%), the Internet (41%) and newspapers (38%) are the main sources of information, while only 25% of the interviewees received information from university studies or debates and 21% indicated public agencies (e.g. the National Health Service) as a source of information. Consumers with humanities and scientific backgrounds draw on different sources of information while employees prefer television, although it is important to stress, for the development of marketing strategies, the presence of the Web, which may well become an important means to reach technologically less well-informed consumers. As a whole, the consumers were well-informed and attentive to health and their food habits: 30% of those with a scientific background always investigated the information while only 10% of consumers with a humanities background and those with no specific cultural background explored such subjects; 12% of the first two groups knew how to get more details but stated they did not have the time, while 34% of those with no specific background stated they had no time at all; no consumer with a scientific background stated they did not know how to get more details, while 20% of the consumers with humanistic background and as many as 35% of the non-university students stated they did not know how to investigate the information. Half of the science-oriented consumers, 34% of the humanities consumers

and 20% of the third group stated that they sought more details selectively: they only investigated what interested them.

However, the term *functional food* is not yet universally known: 33% of the sample stated that they had never heard it used. In choosing what might be, in their opinion, the same thing as functional food, the responses varied greatly (42% considered them fortified). This question was formulated after explaining what functionally food really was. General confusion on the term thus remains, which is also an indicator of general confusion on all new food products. While this may be explained by the lack of unanimously accepted definitions, it is an indicator that consumers are interested in what the product is used for rather than how it is made. The sample interviewed knew the FFs on the market, and some of these such as yogurt with probiotics and Red Bull are widely consumed.

A quick opinion was then sought on this type of food. The group of consumers with a science background was that with the most trust in the capabilities of such foods: 12% were enthusiastic, 78% trusting and only 10% mistrustful; those with a humanities background were much less trusting: only 2% were enthusiastic, 38% trusting, 46% mistrustful and 10% incredulous (they did not believe that a food could bring about health benefits); the consumers without a specific cultural background showed a more positive attitude than the second group: 8% were enthusiastic (approval), 54% trusting (somewhat approval), 24% mistrustful (somewhat disapproval), and 12% incredulous (disapproval).

The most interesting observations emerged from the second part of the questionnaire where the different statements were assessed by the consumers. The pleasure component of the FFs received, on average, the highest score (4.9) together with the judgements that FFs are perceived as expensive but with more attributes and properties. On average, young consumers trust FFs' capacity to provide health effects; they also trust producers and the R&D related to them. In no way do they think that FFs are a sort of mystification but they feel there is a risk of new FFs being too rapidly adopted for marketing reasons. Taste remains an important issue for southern Italian food consumers.

5.2 Ordered probit results

The parameters estimated are presented in Table 3, while the marginal effects are shown in Table 4. Since the parameter estimates of the ordered probit models cannot generally be used to interpret results, our discussion focuses on the statistically significant marginal effects. To estimate the ordered probit parameter and marginal effects STATA 10 program was used.

The results as a whole indicate that having different knowledge endowments is not an important determinant in the likelihood of young consumer acceptance of FFs. But it is also evident that more than the type of formal knowledge in itself (whether humanistic or scientific) it is important to understand the role of the source of information and knowledge. In this sense both high-degree studies (i.e. university) and access to the Internet and newspapers play a major role in conditioning the likelihood to accept FFs. Income, gender and consumer location show no significant impact on the acceptance process.

Moreover, our results highlight the statistical relevance of only two of the eight types of judgements we used in the survey. Both taste and the judgment of needing FFs seemed to play a relevant role within the acceptance evaluation of the interviewed consumers. Consumers who strongly believe that FFs are a complete mystification and are anchored to the search for taste in foods are less likely to accept them in their diet.

Specifically, the belief that FFs are a complete mystification, so they are not effectively needed by consumers, increases the probability of FFs not being accepted at all by 1.4% and "somewhat not accepted" by 4.6%. On the other hand, the judgement of considering FFs as useful increases full acceptance by 1% and the "partial acceptance" by almost 5%. Very close to this is the mechanism related to the judgement about taste. Consumers who are not willing to accept a loss in terms of the taste of their food are less likely to accept FFs. The age of consumers is also important in the acceptance of FFs. Even though the sample was young (under 35 years old) the results show that an increase in age increases the likelihood of accepting FFs.

Table 3.
Ordered probit estimates
Source: Field survey data

Number of obs = 150	LR chi2(21) = 64.70 (Prob > chi2 = 0.0000)		
Log likelihood = -130.74071	Pseudo R2 = 0.1984	Number of correct predictions = 64.7%	
Variable name		Coef.	SE	sig.
	Judgments			
X_1	SATISF	0.0839	0.0814	
X_2	TRUST	0.0621	0.0660	
X_3	NEED	-0.1685	0.0750	**
X_4	HEALTH	0.0096	0.0485	
X_5	DIET	-0.0492	0.0628	
X_6	NUTRITIONAL RISK	0.0669	0.0620	
X_7	TASTE	-0.1150	0.0580	**
X_8	PRICE	0.0262	0.0560	
	Consumer features			
X_9	GROUP	-0.1998	0.2120	
X_{10}	AGE	0.1085	0.0341	***
X_{11}	GEN	-0.3037	0.2111	
X_{13}	INCOME_2	-0.9153	0.6885	
X_{14}	INCOME_3	-0.4655	0.6742	
X_{15}	INCOME_4	-1.1230	0.7000	
X_{16}	INCOME_5	0.1258	0.7467	
	Context			
X_{17}	URBAN	-0.3140	0.2580	
	Information			
X_{18}	TV	0.1925	0.2094	
X_{19}	NEWSP	0.5592	0.2457	**
X_{20}	WEB	-0.6820	0.2393	***
X_{21}	UNIV	0.8792	0.3743	**
X_{22}	PUB_AG	-0.3080	0.2660	

** Denotes a significant variable with a P-value of 0.05 and *** denotes a significant variable with a P-value of 0.01
Definitions of variables in Table 2

Table 4.
Ordered probit estimates of marginal effects

Variable		Y=0			Y=1			Y=2			Y=3		
		dy/dx	SE	sig.	dy/dx	SE	sig.	dy/dx	SE	sig.	dy/dx	SE	sig.
	Judgments												
X_1	SATISF	-0.0070	0.0070		-0.0228	0.0220		0.0242	0.0237		0.0055	0.0056	
X_2	TRUST	-0.0052	0.0056		-0.0169	0.0179		0.0179	0.0191		0.0041	0.0044	
X_3	NEED	0.0140	0.0073	**	0.0458	0.0210	**	-0.0486	0.0227	**	-0.0111	0.0059	*
X_4	HEALTH	-0.0008	0.0040		-0.0026	0.0131		0.0027	0.0140		0.0006	0.0032	
X_5	DIET	0.0041	0.0053		0.0134	0.0172		-0.0142	0.0183		-0.0032	0.0043	
X_6	NUTRITIONAL RISK	-0.0056	0.0055		-0.0182	0.0170		0.0193	0.0181		0.0044	0.0043	
X_7	TASTE	0.0096	0.0055	*	0.0313	0.0162	*	-0.0333	0.0173	**	-0.0076	0.0045	*
X_8	PRICE	-0.0022	0.0047		-0.0071	0.0152		0.0070	0.0162		0.0017	0.0037	
	Consumer features												
X_9	GROUP	0.0166	0.0182		0.0542	0.0583		-0.0577	0.0617		-0.0132	0.0148	
X_{10}	AGE	-0.0090	0.0037	**	-0.0295	0.0099	***	0.0313	0.0106	***	0.0071	0.0032	**
$X_{11}^{\dagger}$	GEN	0.0255	0.0192		0.0819	0.0572		-0.0872	0.0610		-0.0202	0.0155	
$X_{13}^{\dagger}$	INCOME_2	0.1148	0.1232		0.2265	0.1371		-0.2980	0.2310		-0.0434	0.0288	
$X_{14}^{\dagger}$	INCOME_3	0.0432	0.0713		0.1240	0.1750		-0.1390	0.2068		-0.0284	0.0396	
$X_{15}^{\dagger}$	INCOME_4	0.1557	0.1459		0.2610	0.1129		-0.0367	0.2272		-0.0502	0.0289	*
$X_{16}^{\dagger}$	INCOME_5	-0.0095	0.0512		-0.0338	0.1990		0.0342	0.1900		0.0092	0.0602	
	Context												
X_{17}	URBAN	0.2242	0.0171		0.0830	0.0670		-0.0812	0.0596		-0.0247	0.0248	
	Information												
$X_{18}^{\dagger}$	TV	-0.0163	0.0186		-0.0521	0.0569		0.0559	0.0615		0.0125	0.0142	
$X_{19}^{\dagger}$	NEWSP	-0.0425	0.0208	**	-0.1470	0.0645	**	0.1460	0.0608	**	0.0430	0.0255	*
$X_{20}^{\dagger}$	WEB	0.0652	0.0300	**	0.1790	0.0642	***	-0.2020	0.0751	***	-0.0422	0.0198	*
$X_{21}^{\dagger}$	UNIV	-0.0526	0.0227		-0.2160	0.0807	***	0.1770	0.0531	***	0.0910	0.0584	
$X_{22}^{\dagger}$	PUB_AG	0.0301	0.0308		0.0830	0.0716		-0.0960	0.0887		-0.0173	0.0139	

* denotes a significant variable with a P-value of 0.001 and ** denotes a significant variable with a P-value of 0.05 and *** denotes a significant variable with a P-value of 0.01
(†) dy/dx is for discrete change of dummy variable from 0 to 1
Definitions of variables in Table 2

6 Discussion and conclusions

The study analysed a specific group of young consumers according to their location (southern Italy) and type of education. We decided to pursue this research path in order to further our understanding of the role of both sensorial and rational judgments of young consumers when accepting or not accepting FFs. According to our research design this is a strategic issue for both public health agencies and private food firms to develop the production and consumption of FFs both healthily and profitably. We considered as relevant *a priori* both the capacity of consumers to evaluate FFs and the source of information and knowledge endowments they have. Moreover, we used both hedonic and utilitarian features to characterize the consumer judgments and perceptions about FFs. Both descriptive and econometric results substantially confirmed the behavioural hypotheses we made to address the issue of young

consumers' acceptance of FFs. Although FFs may be said to be consumed quite widely among the young, the degree of knowledge and information concerning this food type could play an important and strategic role in their choices. In the "world of young consumers" hedonic characteristics of food, like taste, still play a fundamental role. Indeed, the three groups of consumers showed reluctance to compromise the flavour and taste of a food for its functional characteristics. Technological characteristics appear to have no particular appeal and are not decisive in food choice. The real benefit deriving from FFs is also not yet understood and trusted. Young consumers are positively oriented towards them but are also suspicious and not completely convinced about the capacity of FFs to make their diet healthier.

The research highlighted that *ceteris paribus* the way consumers obtained their information and knowledge is the most important factor to influence their willingness to accept FFs. Why did newspapers and university sources play the opposite role to the web? In the former case the likelihood of consumers accepting FFs strongly decreases while the opposite happens in the latter. We think that this is due to the different mechanisms used by these three media to provide information: while in newspapers and on university courses and/or at debates consumers experience a very qualified and specialist type of information and knowledge acquisition, which mainly relies on the rational and utilitarian component of our choice motivations, the Internet provides a broader type of mechanism, which also involves the hedonic part. Hence, in the case of the Internet people are more willing to acquire information about the experiences of other consumers concerning FFs by, for example, using discussion forums or reading comments within specialized web sites, while newspapers and university activities provide mainly scientific statements and statistical data for example on FF effects on consumers. With the Internet as a source, consumers may become much more involved in the consumption of FFs by stimulating, or as shown in this study, by depressing the pleasure component of food consumption. It makes consumers much less inclined to accept them. The relatively negligible role played by the TV also shows that the impact of FF advertising is still minimal. Again, we think it is related to an insufficient hedonic perception of FFs in the young consumers' process of choice.

In terms of marketing strategies, some remarks should be made on possible public and private interventions. In general, the level of consumer awareness is not sufficiently clear as to allow us to identify a specific demand segment for FFs. The existing confusion means that generic health products still compete with FFs. Therefore they need to be promoted with the aim of making them much more recognizable, avoiding the straightforward replacement of such products with others.

However, public and private interventions must have *information* as the dominant strategy. Though it appears we are saying nothing new, today information on which to structure new marketing strategies has to be constructed with more rigour than in the past. In other words, the higher the degree of innovation possessed by FFs and the impact they could have on health, the more information is required by "modern" consumers. Only by providing such information can FFs be perceived as credible food. New forms of communication and information have to be exploited by both public agencies and private producers in order to capture the more active and critical component of young consumers. The role of the Internet seems to be strategic in this direction. We think that our results and considerations, albeit based merely on a regional case study, might raise awareness among stakeholders keen to promote FFs on the matter of new scenarios and strategies for the near future in this specific food consumption domain.

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