Validation of a Psychometric Scale to Measure Consumers' Fears of Modern Food Technologies

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Abstract

The main consumer trends in food sector are two: on the one hand there is a growing demand for modernity (functional foods, convenience foods, healthy foods such as low calories and low-sodium foods), on the other hand there is a increasing demands for naturalness (organic foods, natural foods, local products and typical products). Moreover, in recent years consumers' fears of novel food technologies are well documented and several psychometric scales were tested for the analysis of consumer's attitude towards new technology.

Therefore the ability to identify population segments that have greater or lesser neophobia/neophilia, thus enabling identification of early adopters of innovative products, would be more and more useful.

A survey which bore such considerations in mind was conducted on a representative sample of 355 people interviewed shortly after their shopping trip to super- and hyper-markets in Campania region. A questionnaire was submitted to sample in spring 2010. The questionnaire collected information about the perception of new food technologies, the perception of naturalness and their roles in determining consumer preferences for different food products. To collect information about consumers perceptions we adopted the FTNS scale (Food Technology Neophobia Scale) which represents a useful tool for assessing receptivity to foods produced by novel technologies.

A specific section of the questionnaire covered a case study and gathered information about the willingness to buy food products that consumers can associate to a greater or lesser use of modern technologies and belonging to a specific set of six food categories: functional foods, low calories foods, convenience foods (ready to eat) typical foods, organic foods, short chain products.

First findings confirm that FTNS scale is a good instrument for predicting individuals' willingness to try foods produced using modern technologies

Moreover first results are consistent across the different types of products and technologies tested and thus provide consistent evidence of predictive validity.

Keywords: *food technology, consumer perception, psychometric scale*

1 Introduction

The main consumer trends in food sector are two: on the one hand there is a growing demand for modernity (functional foods, convenience foods, healthy foods such as low calories and low-sodium foods), on the other hand there is an increasing demand for naturalness (organic foods, natural foods, local products and typical products). Moreover, in recent years consumers' fears of novel food technologies are well documented and several psychometric scales were tested for the analysis of consumer's attitude towards new technology (Coppola, Verneau, 2009; Verneau, 2007; Sparks P & Shepherd, 1994, Eiser et al. 2002; Kirka et al, 2002). Therefore, the ability to identify population segments that have greater or lesser neophobia/neophilia, thus enabling identification of early adopters of innovative products, would be more and more useful (D.N. Cox, G. Evans, 2008; Evans et al. 2010).
This work tries to explore the neophobia/neophilia attitudes carrying out an empirical analysis on a sample of 355 people interviewed shortly after their shopping trip to super- and hyper-markets in Campania region. The questionnaire collects information about the perception of six food categories representing different technologies, the perception of naturalness and its role in determining consumer preferences for the different food categories quoted above. To collect information about consumers perceptions and attitude toward the adoption of new technologies, we chose the FTNS (Food Technology Neophobia Scale) which represents a useful tool for assessing receptivity to foods produced by novel technologies.
In the first part of the paper we discuss the theoretical framework, in the second one the statistical analysis derived from the collected questionnaires will be showed. By means of a factor analysis we will try to synthesize the 13 questions of the FTNS in a smaller set of components. Finally, a specific case will be carried out using a binary logit model. It will analyse the willingness to try food products that consumers can associate to a greater or lesser use of modern technologies and that belong to a specific set of six food categories: functional foods, low calories foods, convenience foods (ready to eat), typical foods, organic foods, short chain products (Hwang et al. 2005, Brunel & Pichon, 2004, Eiser et al, 2002).

2 Psychometric scales and consumer behaviour

Diet is the most intimate form of consumption. As a matter of fact, according to anthropologists, eating means incorporating, taking food inside oneself, within the confines of one's own body (Fischler, 1990; Fischler, 2007). For this reason, diet and food are also characterized by a simultaneous connotations of demand for novelty (neophilia) and by a great caution, at times aversion, concerning the new, the unknown (neophobia). Roughly speaking, it could be said that food choice is a seemingly simple, but in fact very complicated behaviour that is influenced by many interacting factors (Koster, 2009). Also in the field of studies on consumer behaviour, different techniques to synthesize especially the many factors of emotional type and linked to the attitudes and beliefs of individuals have been proposed and gradually developed (Siegrist et al, 2008). One of the most used in the fields of cognitive psychology, consumer science and marketing is represented by the psychometric scales. In particular, the psychometric scales show a high capacity to identify

population segments that have greater or lesser neophobia, thus enabling identification of early adopters of innovative products. In table 1, we show the main psychometric scale linked to the dichotomy nephobia-neophilia with reference to the adoption of new technologies, levels of trust in science and the acceptability of food.

Table 1. Main psychometric scale

Acronym	Full name	Scope of use	Authors
FTNS	**F**ood **T**echnology **N**eophobia **S**cale	Measuring the degree of food neophobia in humans linked to food technologies	Cox D.N., Evans G. (2008)
FNS	**F**ood **N**eophobia **S**cale	Measuring the degree of food neophobia in humans linked to food technologies	Pliner P., et Habden K., (1992)
GNS	**G**eneral **N**eophobia **S**cale	Measuring the trait of neophobia in humans	Pliner P., et Habden K., (1992)
TISS	**T**rust **I**n **S**cience **S**cale	Measuring trust in science and technology	Bak H., (2001)
PFS	**S**cale **P**ower **F**ood	Measurement of 'hedonic impact of environments characterized by highly palatable foods.	Lowe MR., et al., (2003)
PRFI	**P**erceived **F**ood **R**isk **I**ndex	Measuring consumer perception of food risk	Fife-Schaw et Rowe. (1996)

All psychometric scales, shown in the table, use several sets of statements on which respondents are asked to express the level of agreement measured by Likert scales, with scores typically anchored at the extremes 1 and 7 (Fife-Schaw , Rowe, 1996; D.N. Cox, G. Evans, 2008; Evans et al. 2010;). The latest proposed scale for the assessment of the dichotomy nephobia-neophilia is represented by the Food Technology Neophobia Scale (D.N. Cox, G. Evans, 2008; Evans et al. 2010; Weber et al 2002).
The psychometric scale includes 13 items submitted to a subsequent factor analysis. The 13 items are divided into four thematic areas: Usefulness of new food technologies; Perception of risks; Effect on health; Information/ media.
Designed as a development of the FNS, this scale is a useful tool for assessing the impact of new food technologies on consumer choices and the impact of uncertainty on the acceptability of a particular food. However, the FTNS has been validated mainly on specific food technologies or on specific food strictly related to new and sophisticated technological processes (D.N. Cox, G. Evans, 2008; Evans et al. 2010). Then, it seems useful to further validate the Cox scale using, first of all, a set of food products instead of food technologies and, secondly, taking into account a set of commonly used products that can be easily ranked on higher/lower technology content.

2 The empirical analysis

2.1 The survey

The empirical analysis is based on the information obtained from a field survey by means of a questionnaire that focuses on three aspects.
A first section of the questionnaire is aimed at defining the way consumer perceives 6 product categories that include functional, light, frozen and ready to eat products, on the one side, and organic, typical and short chain products, on the other side. For each type of food the consumer was asked whether he/she was confident in and to choose the characteristic that better could represent it among a choice set that relates to safety, environmental impact, naturalness and taste attributes. Moreover, referring to the same attributes, consumers had to indicate on a scale from 1 to 7 (from minimum to maximum) how they characterize the different types of food. Questions on the buying frequencies of each food category were included, too.
The second section of the questionnaire is based on 13 questions taken from the work carried out by Cox (Cox and Evans, 2008). These questions are aimed at inferring:

- the perception of the consumer about technology, its use and benefits;
- the way he/she feels in new situations and behaves when facing unknown circumstances;
- food habits and the propensity to taste new products.

While Cox et al. apply the Food Technology Neophobia Scale (FTNS) to a set of different technologies to verify how the scale is able to correctly predict consumer judgment about specific technologies, in our work the same scale is applied to food categories. That because:

1. consumers are more familiar with product than with technologies. Making a question on technologies is more likely to affect the answer in a negative way;
2. consumers have a better knowledge about products than technologies and then they can more correctly address their opinion.

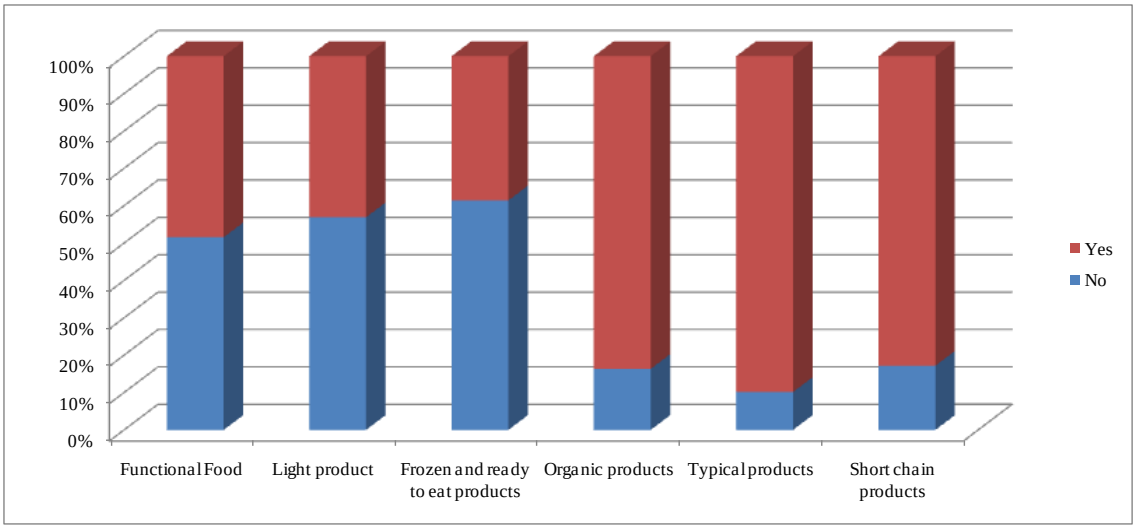
Finally, the third section collects socio-economic, psychographic and demographic information on the interviewees and their families and tries to catch their approach toward the environment, naturalness and traditions.
The survey was carried out during summer 2010 on a sample of 355 people interviewed after their shopping at super and hyper-markets in Campania region. The sample reflects in a representative way the distribution of the regional population as territorial and socio-economic aspects are concerned (table 2).

Table 2. Comparison of the percentage distribution of main socio-economic indicators between the survey sample and the Campania region data

	Campania region	*Sample*
Province		
Avellino	8%	10%
Benevento	5%	7%
Caserta	15%	11%
Napoli	54%	54%
Salerno	18%	18%
Gender		
Male	49%	48%
Female	51%	52%
Education		
Primary school	22%	21%
Middle school	29%	27%
High school	22%	28%
Graduation	15%	24%
Legal status		
Married	38%	37%
Separated	2%	2%
Cohabitant	10%	12%
Single	50%	49%
Professional status		
Self employed	5%	9%
Manager	1%	2%
Employee	20%	20%
Student	18%	15%
Housewife	26%	24%
Retired	12%	9%
Unemployed	11%	9%
Precarious/part time	7%	12%

An explorative analysis of data collected can give some preliminary information on consumers' perception of each food category.

A first result is the dichotomy that comes out when confidence on different food typologies is investigated (graph 1). More than 50% of the interviewees are not confident in manipulated and more processed products; this percentage drops to 10% - 17% when organic, typical and short chain products are concerned (.

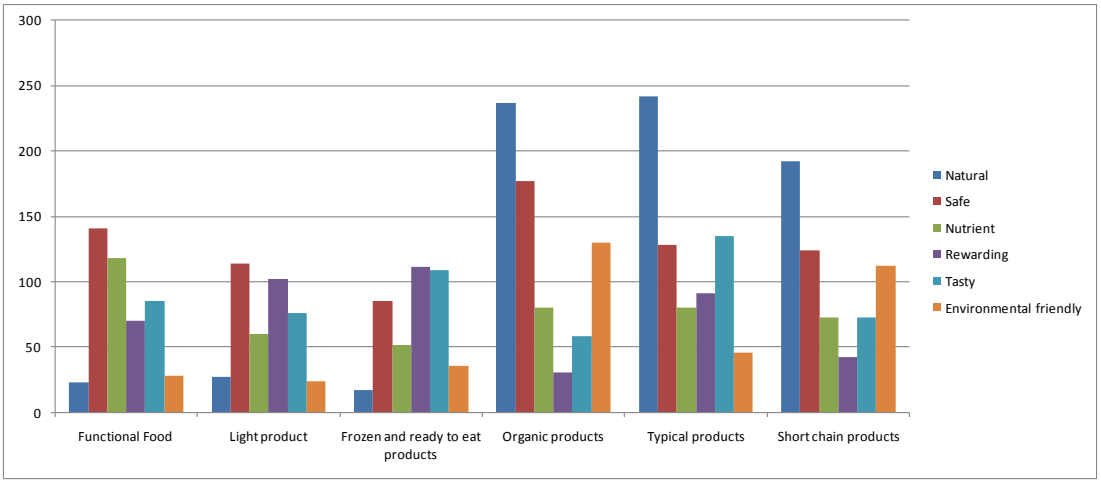


Graph 1. Are you confident on the following products?

To understand which characteristics enter to build the consumer confidence and how that reflects on the food perception, interviewees were asked to choose the adjective that better denotes each of the food categories. Results are summarized in graph 2. Some interesting aspects come out from that graph. First of all, the dichotomy between manipulated and non manipulated products, previously emerged, keeps when characterization of those products is considered. According to the interviewees, organic, typical and short chain products are all well defined by naturalness attribute, while very few individuals believe that functional, light and ready to eat food can be defined as natural. On the contrary, safety seems to be considered a more transversal attribute: it characterizes specifically organic products, but the share of positive answers doesn't highly differ among functional and light products on the one side, and typical and short chain products, on the other side.
Secondly, each food category can be linked to one or few attributes:

- besides naturalness and safety, among less manipulated food organic and short chain products are characterized by environmental friendly attribute, while typical products are better defined as tasty. On the other hand, only the 16% of the interviewees believes that organic products are tasty. More generally, a negative link between naturalness and taste can be pointed out;

- more manipulated products are generally recognized as not natural but safe; besides that, consumers assign a higher importance to nutritional value as functional food are concerned, while light and frozen and ready to eat products are better identified as rewarding (Rozin, et al. 2004, Rozin, 2005; Rozin 2006) . This last attribute seems to be related to their less nutritional value in the case of light products.



Graph 2. Do the following characteristics denote the different categories of products?

The same results come out when consumers are asked to indicate a score, from 1 to 7, to each attribute in relation to food categories (table 3).

Table 3. Means scores

	Natural	Safe	Nutrient	Rewarding	Tasty	Environmental friendly
Functional Food	3,3	3,9	4,4	4,5	4,1	3,3
Light product	3,3	3,7	3,7	3,6	3,8	3,2
Frozen and ready to eat products	3,3	3,7	3,7	4,3	4,4	3,4
Organic products	5,8	5,8	5,9	5,8	5,7	5,9
Typical products	5,9	5,6	5,7	5,9	5,9	5,5
Short chain products	*5,6*	*5,2*	*5,2*	*5,5*	*5,4*	*5,5*

To better understand the relationships between the perception of products categories already discussed, the purchasing habits and consumers attitude towards technology, next step is to synthesize the 13 psychometrics questions derived from the FTNS in to a smaller set of indicators identifying the Cox four thematic areas: Usefulness of new food technologies; Perception of risks; Effect on health; Information/media.
Starting from the 13 psychometrics questions we performed a PCA analysis. The preliminary statistics indicated that the reduced matrix was factorable (Kaiser–Meyer–Olkin Measure of Sampling Adequacy was 0.746 and the Bartlett's Test of Sphericity was 853, df = 70; $p < 0.0001$). The Principal Components analysis with a Varimax rotation resulted in a 4-factor solution that explain the 56% of the whole variance. In table 4 there is the factor loading matrix, that is the basis to interpret the meaning of each principal component.

Table 4. Factor loading matrix

	Components			
	1	2	3	4
It can be risky to switch to new food technologies too quickly	0.777	0.122	0.003	-0.141
New food technologies may have long term negative environmental effects	0.707	-0.045	-0.144	0.026
Society should not depend heavily on technologies to solve its food problems	0.669	0.145	0.123	-0.027
There are plenty of tasty foods around, so we do not need to use new food technologies to produce more	0.479	0.353	-0.341	0.114
New foods are not healthier than traditional foods	-0.136	0.736	0.049	-0.107
The benefits of new food technologies are often grossly overstated	0.141	0.673	-0.120	-0.042
New food technologies are something I am uncertain about	0.447	0.563	0.039	0.124
New food technologies decrease the natural quality of food	0.439	0.514	-0.258	-0.003
There is no sense trying out high-tech food products because the ones I eat are already good enough	0.315	0.510	-0.067	0.395
New food technologies give people more control over their food choices	0.026	-0.091	0.792	0.080
New products using new food technologies can help people have a balanced diet	-0.054	-0.152	0.689	0.250
New food technologies are unlikely to have long term negative health effects	-0.071	0.193	0.621	-0.432
The media usually provides a balanced and unbiased view of new food technologies	-0.136	0.002	0.167	0.804

The first component explains 25,7% of the total variance and allows to identify the connection between perceived risk and technologies: as the first component increases, moving from negative to positive values, consumers perceive technology more and more as an hazardous factor. Then the component can be read as a scale of ***risk*** (Gaskell, 2007). More in detail component 1 is positively correlated to the following statement as "It can be risky to switch to new food technologies too quickly" and "New food technologies may have long term negative environmental effects". The meaning of the component is further defined by the perception of uncertainty associated to food technologies, question that is more strongly correlated with component 2.

Another important contribution to the first component is given by two more questions. According to the first one, society should not depend heavily on technologies to solve its food problems. Even this statement in some way could be linked to risk perception: food security is a strategic matter for society and should not depend upon technologies, which are seen as fragile and not reliable. The second one "There are plenty of tasty foods around, so we do not need to use new food technologies to produce more" keeps to define an adverse attitude towards technology, adding an ideological connotation to this first component, even if it shows a more transversal correlation with three of the four components.

The second factor extracted (12,2 of explained variance) summarizes the assessment of respondents about the usefulness of the adoption of new technologies and, more generally captures the level of uncertainty (***Uselessness of Technology*** component). When positive, the second component identifies consumers who do not recognize any real benefit stemming from the introduction of new technologies in food sector. This approach is reinforced by the perception of uncertainty (New food technologies are something I am uncertain about) (Hansen, 2003; Frewer & Salter,2003). On the contrary, negative values of the component occur when consumers believe that new technologies can produce more benefit in terms of healthy nutrition, taste and food quality.
The third component (9,5% of the total variance) is positively correlated with the perception of benefits of new food technologies in terms control over food choices; capacity to have a balanced diet and health effects (***Benefits and healthy effects***) (Weber et al., 2002)
Aspects referring to the role of media in conveying information on food technology are shown by the fourth component (***Trust in media role***). Positive values of the fourth component (8,5% of the total variance) identify those consumers who think that media usually provides a balanced and unbiased information. This kind of trust is particularly relevant as new food technologies are thought to have long term negative health effects (negative correlation of the related statement with the fourth component).

2.2 The econometric model

Since we wanted to evaluate to what extent the variables stemming from the questionnaire and showing a link with the perception of risk affect the decision to enter the market of the products obtained with modern and sophisticated technologies, we estimated an econometric model that analyses the choice of the individual to take part in the market. The statistical model adopted in this work starts from the hypothesis that the population of interviewees consisted of two sub-populations, one of which was interested in the purchase of food products with higher technological content and the other unwilling to enter this product market.
The objective of the econometric analysis is to evaluate the existence and nature of the relationship between the decision to participate in this market and the attitude of consumers towards the technologies that in the present work was measured by the FTNS.
The dependent or response variable is represented by the event that the consumer is interested in the purchase and consumption of at least one of the three proposed products categories that are based on the use of modern technology. This variable is measured against a set of explanatory or independent variables, extracted from the data emerging from the questionnaire or generated by factor analysis.
In formal terms, the binary models may be expressed as follows:

$$\gamma = \textit{Prob}\,(\textit{Yi} = 1) = \textit{F}\,(\beta' \textit{Xi}) \text{ con } i = 1,2,\ldots n$$

where:

- Y_i is a sequence of independent binary random variables that are equal to 1 when the interviewee is willing to buy the product, 0 otherwise;
- X_i is a vector of the explanatory variables;
- β' is a vector of parameters to be estimated;
- F is a known function.

This function usually belongs to a parametric family such as normal, logistic, log-normal and normal logistic. In the case in question it is assumed that F is distributed as a logistic, and a log-linear Logit analytical procedure is thus used (Kennedy, 1992; Piccolo, 1998).
Given the groups of variables found in this survey, the general theoretical model to which reference is made may be formalised as follows:

$$y = \boldsymbol{Prob}\,(\boldsymbol{Yi} = 1) = \boldsymbol{F}\,(\beta'_{\boldsymbol{SE}}\,\boldsymbol{SEi} + \beta'_{\boldsymbol{TCFOB}}\,\boldsymbol{TCFOB_i} + u_i)$$

in which:

- i = 1,2,…n is the index of the interviewees;
- SE_i indicates the group of variables relative to the respondent's socio-economic and demographic characteristics, such as education level, income, age, gender, occupation and so forth;
- $TCFOB_i$ refers to the group of variables that affect the perception of technology in relation to the food categories presented in the questionnaire and characterized by traditional or modern types of production and processing. These variables are represented by factors extracted from the factor analysis;

The descriptive analysis showed that the decision to take part in the market is affected by the second group of factors described above. However, the way of action of the variables belonging to that group, depend on the complex of socio-economic and demographic characteristics that define the profile of the consumers surveyed. For example, it was noted that the variables gender and residence in large urban areas are characterized by a relationship of dependency with the different variables that seek to represent the purchasing behavior of the interviewees. By contrast, income and profession did not show dependence with purchasing behavior.
In constructing the empirical model we started from a very broad set of independent variables, from which all the regressors unable to significantly explain the behaviour of the dependent variable were progressively excluded. The empirical model which, in terms of significance[1] of coefficients, best estimates willingness to join the microfiltered milk market is as follows:

[1] Significance is always guaranteed at least at the 95% level.

$$Y_i = C + \beta'_{RISCK}\, RISKi + \beta'_{UoT}\, UoT_i + \beta'_{Gender}\, Gender_i + \beta'_{Children}\, Children_i + \beta'_{Urban}\, Urban_i$$

where :

Y = it is the dependent variable. It takes value 1 if the respondent has stated its intention to buy, in the week following the interview, at least one of the three products related to the use of modern technologies. Otherwise, it takes the value 0.

Risk = It 's the first factor extracted in the PCA and it summarizes the level of perceived risk associated with the use of technology in the food industry. It is a continuous variable and with regard to the 355 observations it assume values between -3.70 and 2.85.

UoT (Uselessness of Technologies) = It 's the second factor extracted and summarizes the assessment of respondents about the usefulness of the adoption of new technologies and, more generally captures the level of uncertainty. Again it is a continuous variable and it assumes values between -3.08 and 2.71.

GENDER = This is a dichotomous variable that assumes the value of 1 for male interviewees and 2 for females.

CHILDREN = It 's a dichotomous variable that takes value 1 when there are children aged less than 12 years and 0 otherwise.

URBAN = It 's a dichotomous variable that seeks to identify the respondents living in urban areas. It takes value 1 if respondents live in the metropolitan area of Naples and 0 otherwise. The metropolitan area of Naples is characterized by high population density and a widespread presence of large retail chains. It counts more than 3 million inhabitants.

For each of the variables listed in Table 5, the main statistics:

Table 5. Main descriptive statistics

	Y	Risk	Uselessness of Technologies	Urban	Gender	Children
Mean	0,33	0,00	0,00	0,53	1,51	0,28
Median	0,00	0,03	0,07	1,00	2,00	0,00
Std. Dev.	0,47	1,00	1,00	0,50	0,50	0,45
Min	0,00	-3,70	-3,08	0,00	1,00	0,00
Max	1,00	2,85	2,71	1,00	2,00	1,00
Obs.	355	355	355	355	355	355

Overall, the model shows a good explanatory capacity. Indeed, the prediction index which measures the relation between Y values correctly determined and total Y values observed is 73,0. This means that in 73% of cases the calculated values of Y were the same value, 1 or 0, as the Y observed. The results are listed in table 6.

Table 6. Main results of the logit model

Variables	*Coefficients*	*Std Error.*	*z*	*p-value*	*Odds ratio*	*Δ%*
C	-2,45589	0,45994	-5,3396	<0,00001		
Risk	-0,768945	0,145134	-5,2982	<0,00001	0,4635	-53,650
Uselessness of technology	-0,371117	0,12995	-2,8558	0,00429	0,6900	-31,004
Children	-0,612559	0,296807	-2,0638	0,03903	0,5420	-45,804
Gender	0,875282	0,264575	3,3083	0,00094	2,3996	139,955
Urban	0,814230	0,258486	3,1500	0,00163	2,2574	125,744

Dependent variable mean	0,329577	SQM dependent var.	0,208293
McFadden R^2	0,146522	Adjusted R^2	0,119858
Log- Likelihood	-192,0557	Akaike's Information Criterion	396,1114
Schwarz Criterion	419,3441	Hannan-Quinn	405,3539
Number of Right Predictions	259	Percent. of Right Predictions	73,0%
Likelihood ratio test χ^2 *(5)*	65,943 [0,000]		

Success prediction table			
	Predicted		
		0	**1**
Observed	**0**	216	22
	1	74	43

In conclusion:

$$Y_i = -2{,}4559\boldsymbol{C} - 0{,}76894\boldsymbol{RISK}_i - 0{,}37112\boldsymbol{NoT}_i + 0{,}87528\,\boldsymbol{Gender}_i - 0{,}61256\,\boldsymbol{Children}_i + 0{,}81423\boldsymbol{Urban}_i$$

In light of the results obtained, as illustrated above, it may be concluded that the willingness to enter the market of proposed food categories depends:

- negatively on the factor called Risk: that is, the greater the perception of risk and therefore the higher the values of the component and the less likely it is that the interviewee is willing to take part in the market for products with high technology content;
- negatively on the factor called Uselessness of Technologies: respondents showing greater skepticism, toward food technologies and their usefulness to society, are associated with a low probability of entry the market for products with high technological content
- positively on the female gender: the analysis shows that female gender audience is associated with a higher probability of participation in the market;
- negatively by the presence of children aged less than 12 years;
- positively on the residence in the large urban area of Naples.

The proposed model incorporates two of the four factors extracted from the psychometric scale. These components were found to be the main factors extracted from the factor analysis and therefore as those that explain most of the variance. The propensity to purchase food products obtained with sophisticated technologies is therefore affected mostly by the perception of risk and judgment about the usefulness of technologies. When perceived risk and uncertainty about the usefulness and necessity of technology are high, consumers tend to not participate in the market. The odds ratio and the percentage changes reported in Table 6, demonstrate and quantify the role of the two factors. For every unit increase in risk factor the probability of entry the market for technology products decrease by about 53%. Instead, for the factor Uselessness of Technologies the variation is equal to -31%. Third and fourth component weren't found statistical significant and then didn't enter the model. An important role in determining the probability to purchase an innovative products is also played by demographics variables. Both gender and residence in urban areas double the probability.

3 Conclusions

Three main conclusion can be drawn:
Our survey confirm that the psychometric scale used by Cox et al. can well catch the dichotomy between neophobia and neophilia attitudes: as a fact the PCA analysis extracted 4 factors which can be classified in a way very close to that proposed by Cox in his work. More in detail the first two factors (risk and uselessness of technology) are strictly linked to the more or less innovative behavior of the interviewees and as a matter of fact, both factors have an important role in determining the probability to buy a more technological product.
In the model we found three demographic variables that influence the purchasing probability. Gender seems to behave in a different way respect to what underlined in the psychological literature that associates to female a more prudential behavior. In our case we found they are more disposed towards technologies. That can be explained bearing in mind that in Southern Italy females are very often responsible for food purchases and this enhance the experience and then makes females more familiar to new and convenience food. On the contrary, as expected a more prudential behavior is found in families with children where parents try to protect them offering guaranteed and well known food. Finally, people living in urban areas, seems to be more open to new and to product with high technological content. Besides that, the modern distribution and large retain chain, more developed in these areas, can modify the a priori beliefs and accelerate the change in consumers food styles.
The socio-economic variables such as income, education level and professional status didn't relate with the purchasing attitudes. Then, the model seems to confirm that food behavior is strongly affected by emotional and ideological factors, while it is less and less explained by variables traditionally adopted in the economic models, such as income and knowledge.

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