Short communication. Exploring new functional markets potential: factors affecting willingness to purchase functional wines

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Abstract

Concern regarding the relationship between diet and health is growing among consumers. As an answer to this concern, the food industry has developed functional foods, a market with an increasing demand both in volume and expenditure. New functional products are being developed for which market potential must be investigated. This paper centres on one of this products, a wine with increased levels of resveratrol, a natural compound which has been found to be positively related to the reduction in the risk of inflammatory diseases. The market potential of this new product is assessed using a survey of wine consumers in the city of Granada (Spain). Consumers are asked for the probability of purchasing this new wine in order to identify «potential consumers» and factors influencing belonging to this category are identified. A significant proportion of the sample is found to belong to the «potential consumers» category with cognitive, affective and situational variables as the main factors affecting inclusion within this category.

Additional key words: Andalusia, binary logistic regression, demand, functional foods, red wine, resveratrol.

Resumen

Comunicación corta. Nuevos mercados funcionales: factores que influyen en la probabilidad de compra de vinos funcionales

La preocupación por la relación entre salud y dieta está creciendo entre los consumidores. Como respuesta a esta preocupación, la industria agroalimentaria ha desarrollado los denominados alimentos funcionales, un mercado que experimenta una demanda creciente tanto en volumen como en gasto. Ante el desarrollo de nuevos productos es necesario conocer su potencial de mercado. El presente trabajo se centra en uno de estos productos, un vino producido a partir de uvas con niveles incrementados de resveratrol, un compuesto que ha sido relacionado positivamente con la reducción en el riesgo de enfermedades inflamatorias. El potencial de mercado para este producto se estima a partir de una encuesta a consumidores de vino en la ciudad de Granada (España). Se pregunta a los consumidores por su probabilidad de compra de este producto para identificar a los «consumidores potenciales», así como los factores que influyen en la pertenencia a dicho grupo. Una proporción significativa de la muestra es identificada como «consumidores potenciales», siendo factores de tipo cognitivo, afectivo y situacionales los que afectan a la inclusión de los individuos en ese segmento.

Palabras clave adicionales: alimentos funcionales, Andalucía, demanda, regresión logística binaria, resveratrol, vino tino.

Relationship between nutrition and health is gaining importance for consumers when making food purchase decisions (Chern and Rickertsen, 2003). As a response to this shift in consumer demand, and driven by technology developments, functional foods have arisen as the fastest growing food market with latest estimates forecasting an expected annual growth rate of 10% for functional foods as compared to an average 2-3% rate for food industry as a whole (Verbeke, 2005). This growth, at least in the US case, has been exponential, with functional foods evolving from a nearly non-existing market in 1995 to a market that out-sized organic and dietary supplements in less than six years (Kinsey, 2001). Although there is much confusion regarding what is and what is not a functional food, a consensus definition could be that of a food that can

«satisfactorily demonstrate to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either improved stage of health and well-being and/or reduction of risk of disease» (Diplock *et al.*, 1999). In the Spanish market, consumers find over 200 different functional foods and their market share could be as high as 33% of all food expenditure (Eroski, no date), with 75% of consumers declaring to purchase functional foods at least occasionally (Sánchez and Barrena, 2004).

Prior research (Poulsen, 1999) has identified consumers accepting functionality in previously healthy products and through increases in substances already present in the «regular» version of the product, thus developing functionality in wine seems a straightforward strategy. Wine has been traditionally identified as a health promoting product due to its effects on coronary heart disease (after the so called «French-paradox»; Renaud and De Lorgeril, 1992), on the delay of tumour onset (Clifford *et al.*, 1996; Delmas *et al.*, 2006) and its high antioxidant activity (Paganga *et al.*, 1999; Kirimlioglu *et al.*, 2006). These benefits have been ascribed to the phenolic compounds which are abundant in red wine (Burns *et al.*, 2000), among these phenolics, the stilbenes group is one of the most important, with resveratrol (3,5,4'–trihydroxystilbene) being one of the main stilbenes found in wine. Therefore, wine with higher resveratrol content could be considered «functional wine» due to the improvement of several health-beneficial activities[1]. This functional product would fall in the category of those obtained through the increase of a natural occurring compound (Roberfroid, 2000).

The objective of the present study is to assess whether functional wines could be a new market within the broad category of «functional foods» and identify factors affecting consumer's probability of purchasing this new product. This study contributes to improve and broaden current knowledge on functional food demand in several ways: by evaluating a new product category (wine) and a new component with functional properties (resveratrol) and by studying a market not extensively considered (Mediterranean countries, Spain in particular). Prior research on attitudes towards functional foods (i.e. Poulsen, 1999; Urala and Lähteenmäki, 2004) has highlighted the importance of product specific attitudes and consumer segmentation on the acceptance of functional foods. Therefore it can be argued that product development and marketing strategies for functional wine could be different from other functional products. Moreover, Verbeke (2006) concludes, after assessing potential trade-offs between taste and functionality for Belgian consumers, that «*future research* (on acceptability of functional foods) *focusing on specific functional foods, rather than on functional foods as an abstract category ... is recommended*» (p. 130).

The Andalusian Agricultural Research Institute (IFAPA) is currently developing the technology to produce wine with enriched resveratrol content. This development is based on the experience of Cantos *et al.* (2003) who report the impact of using resveratrol enhanced grapes on resveratrol concentration and quality-related proprieties of wine. This research shows that two-fold concentration of resveratrol in wine can be achieved without affecting standard enological parameters (colour, acidity, etc.). As their case study used a grape variety not too prone for resveratrol enrichment and make-shift wine making techniques, it can be expected that with better grape varieties and optimum wine making process resveratrol contents could easily reach the five-fold level considered in this study. A recent review of studies analysing resveratrol content in wine (Stervbo, 2007) concludes that on average red wine contents 1.9 mg of resveratrol per litre. If industry were to uptake this technology to increase resveratrol concentration, some information on the potential demand must be provided to assure their return for investments will be justified, this paper tries to measure this potential demand using a stated preference approach.

Since the functional food used in this study (wine produced with resveratrol enriched grapes) is not commercially available yet, no secondary data from real markets can be used to evaluate consumer preferences and values applying revealed preference approaches (i.a. hedonic prices). Therefore, methods based on stated preferences must be employed for this objective. Among the different approaches available to measure stated preferences, this study uses a subjective measure of «consumption intention»[2]. This kind of measure has been the most commonly used to study functional food demand. Consumption intention has been defined in two different

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[1] Among these antioxidant, cardioprotective and cancer chemopreventive can be highlighted. Soleas *et al.* (2002) report over 200 scientific publications regarding the effects of stilbenes in general on health.

[2] Alternative approaches have been used in the domain of functional foods to provide estimates of monetary valuation of non-existing products as an alternative for purchase intention [i.a. contingent valuation (Maynard and Franklin, 2003) or choice experiments (Teratanavat and Hooker, 2006)].

ways in functional food demand literature: «acceptance of functional foods» (Bech-Larsen *et al.,* 2001; Verbeke, 2005) and «willingness / likelihood / intention to purchase functional foods» (i.e. O'Connor *et al.,* 2005; Huotilainen *et al.,* 2006; Cox and Bastiaans, 2007; Lyly *et al.,* 2007; Urala and Lähteenmäki, 2007). The latter approach is chosen for this study, using a 10-point scale to measure the probability of purchase where this product to be available in the usual place where wine purchases take place.

Both individual socio-demographics as well as attitudes and believes (Verbeke, 2005) and taste (Verbeke, 2006; Lyly *et al.,* 2007) have been identified to affect functional foods consumption intention. Reviewing the literature only two studies concerning functional foods can be found in Spain (Barrena and Sánchez, 2004; Sánchez and Barrena, 2004). These studies identified consumer groups more likely to buy functional foods and the role that perceived relationship between health and nutrition plays in the choice of these products. Results indicate the most preferred functional foods for Spanish consumers are those preventing coronary and cancer related diseases; the main reason for consuming these products is their potential beneficial effect on health (Sánchez and Barrena, 2004). This is interesting for the purposes of the present study since resveratrol enhanced products would fall into this category. Barrena and Sánchez (2004) identified three main types of aspects affecting purchase decision: interest shown on the food- health relationship, label information read when purchasing food products and other aspects. Label information seems to play a determining role for some consumers, while the believe in health benefits is the most important factor affecting purchase decision, a finding consistent with research reported in international studies (Urala and Lähteenmäki, 2004; Verbeke, 2005; Cox and Bastiaans, 2007).

As motives for wine purchase differ according to occasion (Martínez-Carrasco *et al.*, 2006), this paper is focused on consumption by households which accounts for 35.4% of total quality red wine consumption (MAPA, 2004). A stratified sample based on the place where quality wine purchases takes place was used with posterior random sampling. Therefore, sample size per type of establishment (hypermarkets, supermarkets and traditional shops) was fixed according to real purchase data provided by MERCASA (2005). Then, consumers were selected randomly interviewing each fifth person which purchased wine in a determined establishment. The objective population of this study is that of wine consumers in the city of Granada (Andalusia, Spain) and 300 of them were interviewed during the months of February and March 2006. This provides a sample error of 5.7% and a confidence level of 95.5% when estimating proportions ($p = q = 0.5$; $k = 2$). A description of the sample characteristics as well as sample and reference population figures for relevant socio-demographic variables (where available) are given in Table 1.

An initial questionnaire was designed by the research team focusing on wine consumption, functional foods and attitudes towards health, nutrition and food technology and tested on a pilot sample of 20 individuals carried out prior to the main survey. As resveratrol is an unknown substance for consumers (only 1% of total sample declared knowing what this compound is), a brief description of its proprieties and the process that leads to the increased presence in wine was presented to all interviewees. The description tried to be as «neutral» as possible as well as resembling the «real» characteristics of the wine currently being developed, nevertheless, this description can be considered as a «*nutritional and health claim*» for the product considered[3]. Following this description, consumers were asked about the «probability of purchasing a wine produced from resveratrol enhanced grapes» using an increasing 10-point scale.

Relevant information has been gathered for wine consumption, functional foods consumption and health-related data. As far as wine consumption is concerned, average household monthly wine purchases stand at 3.8 bottles (2.85 L) equivalent to 34.2 L yr^{-1}, with an average household size of 3.37 individuals, sample's annual per cápita consumption is 10.15 L. This figure

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[3] The text read to all individuals was the following: «*Resveratrol is a compound found naturally in grapes. Under normal circumstances it can be found in very low concentrations or even not found in wine, being this concentration higher in red wines. Numerous scientific studies (more than 200 in the last two years) have detected a positive relationship between resveratrol and the reduction in the risk of certain illnesses such as arteriosclerosis, cancer, brain isquemias and inflammatory diseases in general. Nowadays it is possible to increase resveratrol content in grapes (and therefore in products derived from them such as wine) using postharvest physical treatments. Thus, wine produced from grapes that has undergone this treatment can contain up to five times as much resveratrol as wine produced from regular grapes. It has been shown that the increase in resveratrol content does not affect the wine's organoleptic characteristics (taste, colour, aroma, etc.)*» As this description mentions the increase of a nutrient and the effect this nutrient has on health, it can be considered a nutritional and health claim as defined in OJ (2006).

Table 1. Sample description and basic socio-demographic profile

Sample details	
Objective population:	Wine consumers in the city of Granada (> 100,000)
Type of survey:	Face to face in place of wine purchases
Pilot survey:	February 2006 (N = 20)
Sample error:	5.7%
Confidence level:	95.5% (p = q = 0.5; k = 2)
Sampling:	Random stratified by regular place of wine purchase
Field work:	February-March 2006

Descriptive statistics for socio-demographic variables			
Variable (units)		Sample	Population
Gender	Female (%)	51.7	53.4
Age	Mean	46.5	45.9
	Max.	78	—
	Min.	21	—
	Std. deviation	12.7	—
Income per cápita	Mean (€ month^{-1})	689.1	—
	Max.	4,500	—
	Min.	150	—
	Std. deviation	561.4	—
Educational level	Primary (%)	40.3	34.9
	Secondary (%)	32.7	36.7
	University (%)	27.0	28.3

Source: Questionnaire and INE (2004).

is significantly above national average for 2004 (6.57 L; Martín Cerdeño, 2006), but it must be considered that non-consumers are excluded from the current sample. Consumption patterns for the sample show that 32.7% drink wine every day, 28.3% two or three times per week, 24.7% two or three times per month and 14.3% once a month or less. The average maximum price consumers pay for red wine in normal circumstances is 10.1 € per bottle with only 29.7% of total sample paying 12 € or more for a bottle of wine. Consumers identify wine as a healthy product, only one respondent did not consider wine as such, although only 17% of the total sample could mention what makes wine a healthy product, and a mere 34% of them (6% of total sample) provided a correct answer (presence of anti-oxidants or polyphenols). From this information it can be concluded that there is a lack of knowledge regarding the healthy proprieties of wine, but this does not prevent consumers from thinking that wine is a healthy product.

Regarding functional foods, 91.3% of the total sample declares knowledge regarding this type of products and 91.7% of the sample consumes them. This percentage is higher than the ones reported by Sánchez and Barrena

(2004) for Navarra and Madrid which were 75% and 84% respectively.

Table 2 reflects the descriptive statistics for the probability of purchase variable. The probability distribution is split into two groups, «potential purchasers» (p > 7) and «non-purchasers» (p ≤ 7) generating a dichotomous variable. This cut-off point has been selected for

Table 2. Frequency of probability of functional wine purchase answers

Probability	N	%	Cumulative %
2	2	0.7	0.7
3	6	2.0	2.7
4	3	1.0	3.7
5	49	16.3	20.0
6	55	18.3	38.3
7	78	26.0	64.3
8	60	20.0	84.3
9	20	6.7	91.0
10	27	9.0	100.0
Total	300	100.0	100.0

Source: Questionnaire.

two reasons, first it can be considered that a 0.8 probability or higher reflects a strong commitment regarding future purchase intention and second it allows the «potential purchaser» group to have a sufficient size (35.7%) as to allow for good overall model fitting. Due to the binary nature of the dependent variable a binary logistic regression model (Greene, 2003) has been used to identify factors affecting potential purchase; all analysis have been carried out using LIMDEP© 7.0 software. Contrary to bivariate analysis, this model allows to identify the simultaneous effect of multiple variables on the probability of purchase, thus better reflecting the complexity among individual consumers (Verbeke, 2005).

The model specified in equation [1] has been finally selected. Independent variables have been selected taking into account whether the associated parameters were found to be significantly different from zero, including first all variables considered to affect potentially the potential purchase decision and dropping those which failed to reach the 10% confidence level.

$$\text{Prob. [Potential-Purchaser = 1]}_i = b_0 +$$
$$+ b_1 \text{MAXWINEPRICE}_i + b_2 \text{READLABELS}_i +$$
$$+ b_3 \text{NUTKNOWLEDGE}_i + b_4 \text{QUALITY}_i + \quad [1]$$
$$+ b_5 \text{PACKAGING}_{i+} e_i$$

The variables included in the model have been constructed as follows:

— *MAXWINEPRICE:* continuous variable which reflects the maximum price individuals declare to pay for a bottle of wine to be consumed at home.

— *READLABELS:* dummy variable which takes value one if the individual answers agrees with the statement «*I read carefully nutritional information on food labels*» and zero otherwise.

— *NUTKNOWLEDGE:* dummy variable which takes value one if the individual gave three correct answers to items related to nutrition in the questionnaire and zero otherwise[4].

— *QUALITY:* continuous variable which reflects the degree of agreement, using an increasing 5-point scale, declared by the consumer with regards to the statement «*functional foods are of higher quality than their non-functional equivalents*».

— *PACKAGING:* dummy variable which takes value one if consumers consider packaging as a very important factor when making wine purchase decisions.

Results for the estimated model are presented in Table 3. As it can be seen, the model is highly significant both considered globally (as reflected by the values obtained for the Log-likelihood ratio and the improvement over the naïve model) and for each independent variable considered individually (p-values below 0.05 except for packaging which is below 0.10).

From the results presented, it seems that functional foods have become a regular component of the purchasing basket of Spanish consumers. The most commonly consumed functional food is a dairy product (76% of all consumed functional foods) and following the classification put forward by Roberfroid (2000) the most commonly purchased functional food would be one characterised by the «addition of a component not

Table 3. Logit model for potential acceptance of functional wines

Variable	Coefficient	Standard error	p-value	$\overline{X}$
CONSTANT	−8.1868	1.3204	0.0000	—
MAXWINEPRICE	0.3300	0.0590	0.0000	10.2705
READLABELS	1.6867	0.4277	0.0001	0.7402
NUTKNOWLEDGE	0.8719	0.3017	0.0039	0.4555
QUALITY	0.5151	0.2282	0.0240	4.2099
PACKAGING	0.5737	0.3036	0.0588	0.4769

N: 281 / Log-likelihood ratio = 100.67 / Significance level $\chi^2_{(5D.E)}$: 0.0000
Correct predictions: 76.9 % / Improvement over naïve model: 23.44%
Nagelkerke's R^2: 0.41

$\overline{X}$: mean value of independent variable.
p-value: probability of rejecting the null hypothesis of coefficient equal to zero.

Source: Questionnaire and own calculations.

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[4] Nutritional knowledge questions following the approach proposed by Drichoutis *et al*. (2005) included selecting between two products which had more fat, the same task but related to cholesterol and declaring which was the recommended daily calorie intake.

presented naturally in the original food product» (65.6% of all consumed functional foods)[5].

Answering the objective of this paper, there seems to be a potential market for functionality in wine, as over one third of current wine consumers can be classified as potential functional wine consumers. Nevertheless, this assertion must be taken with caution as a mere 10% of the total sample declares absolute certainty regarding future purchases (purchase probability of 1). No socio-demographic variables have been found to affect whether individuals can be classified as «potential purchasers» or not, although this finding can be considered striking at first this is in line with those reported by Verbeke (2005) who claims that its cognitive, affective and situational factors as the main determinants of functional foods acceptance. The model specified in [1] also support this claim as all significant variables fall inside these three categories. As far as cognitive factors are concerned, consumers with a higher probability of purchasing the functional wine offered show a higher level of nutritional knowledge and tend to read nutritional information on products labels more often. When an individual is declaring a high purchase probability s/he is valuing this nutritional information provided, therefore, this finding is in line with those reported by Loureiro *et al.* (2006) and Gracia *et al.* (2007) with regards to the positive impact of these two variables on nutritional labelling valuation. Regarding affective factors, consumers who believe functional foods have higher quality than their non-functional equivalents are more likely to purchase functional wines. Last, and regarding situational factors, potential consumers also consider packaging an important factor when making their wine purchases decisions and are currently paying higher prices for wine. Packaging has been detected as an important factor within the wine category purchase decision making process (Hasltead, 2002) and the results shown support that functionality in wine has a higher potential within the consumer segment that is more influenced by packaging in their purchase decisions.

A key strategy to transform this potential market into reality will be the promotion of functional wine so that respondents link the benefits derived from resveratrol content with the general believe of «wine as a healthy product». Functionality in this study was marketed using a «nutritional and health claim» similar to those present in the Spanish market for functional foods. This claim probably induced some of the potential demand detected (consumers were not aware of resveratrol as a healthy component in wine) a hypothesis supported by the effect of the variable «READLABELS» on purchase intention, which reflects that those consumers who read nutritional information on food products are more prone to functional wine purchase. Therefore, if the results reported are to be extrapolated to real markets, nutritional and health claims need to be made for wine. Health and nutritional claims in food products in Spain are regulated from June 2007 by a new EU regulation which foresees that these claims will be allowed once approved by the relevant food authority (Regulation 1924/2006; OJ, 2006). The Regulation explicitly excludes health and nutritional claims in any product containing more than 1.2% by volume of alcohol except for those related to reduction in alcohol or energy content (article 4, section 3) and it is not foreseen in the near future that an exception will be made for wine (Andreu Palou[6], personal communication). Requesting an exception for wine would be a good strategy as it would capture a potential market niche. This exemption could be granted as wine is treated separately from most alcoholic beverages due to its health proprieties when consumed moderately. Generic advertising of resveratrol properties could be a substitute approach in the mean time together with promotion of increased nutritional knowledge in the general population. Some of these efforts, increase awareness of resveratrol properties, can be undertaken by the wine industry itself but increasing nutritional knowledge in the population is a task that has to be undertaken at a broader level. If the health status of citizens is to be improved through diet, communication and education regarding nutritional information needs to be generalised and its understanding assured as impact on diet changes has been found to be positively related to it (Szykman *et al.*, 1997).

Several limitations from the present research must be highlighted, most of them related to the exploratory nature of results presented. The sample used, although representative of wine consumers in the city of Granada, cannot be extrapolated to the average Spanish consumer. Granada is among the poorest provinces in Spain and income effects have been detected as relevant in wine and functional food purchase behaviour (Brugarolas *et al.*, 2005; Teratanavat and Hooker, 2006). Future

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[5] The most commonly consumed functional food would be fermented milk with added bacteria such as L-casei or vegetal components.
[6] Second Vice-President of the European Commission's Scientific Committee on Food.

research should be devoted to identifying the price premiums consumers would be willing to pay for functional wines, price has not been included as an attribute in the design of the purchase intention model, but the influence of the variable MAXWINEPRICE shows that its consumers currently paying higher prices for wine who declare a higher probability of purchasing the functional wine and therefore potential for higher prices for functional wines can be inferred. Nevertheless, monetary valuation of the functional attributes should be obtained (i.e. using contingent valuation or choice experiments) in order to see whether price premiums cover additional production costs, and therefore resveratrol enhanced wine is a viable product (Maynard and Franklin, 2003). In the meantime, the results presented can be considered an initial support for the development of functional wines based on market potential.

Acknowledgments

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