

Who are the potential consumers of organic fruits and vegetables in Central Chile? A CHAID approach

¿Quiénes son los potenciales consumidores de frutas y verduras orgánicas en Chile Central? Una aproximación CHAID

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ABSTRACT

The demand for organic fruits and vegetables (F&V) is growing worldwide, creating market opportunities for developing countries as major suppliers. However, most export-oriented developing countries such as Chile have an undeveloped domestic market for organic products. This article identifies the segments of potential consumers of organic F&V in Central Chile using an exploratory CHAID model. A questionnaire was administered by surveying a random sample of 425 F&V consumers in central Chile. The results of the CHAID model suggest two segments of potential consumers of organic F&V. Both groups show awareness of the concept of organic food. Additionally, the first segment perceives organic agriculture to have ethical benefits to the society and considers organic F&V as healthy and nutritious; this group has a probability of over 80% to consume organic F&V. The second segment shows less awareness of the ethical benefits to society and its probability of consuming organic F&V depends on family income level. We discuss major implications for further studies on organic consumers.

Keywords

organic products • consumer behavior • multivariate analysis • segmentation • Chile

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RESUMEN

La demanda por frutas y verduras (F&V) orgánicas está creciendo alrededor del mundo, creando oportunidades de mercado para los países en desarrollo como principales proveedores. Sin embargo, la mayoría de los países en vías de desarrollo orientados a la exportación, tales como Chile, tienen un mercado interno no desarrollado para los productos orgánicos. Este artículo identifica los segmentos de potenciales consumidores de frutas y verduras orgánicas en el centro de Chile, utilizando un modelo CHAID exploratorio. Se aplicó un cuestionario a una muestra aleatoria de 425 compradores de frutas y verduras. Los resultados del modelo CHAID sugieren dos segmentos de potenciales consumidores de frutas y verduras orgánicas. Ambos grupos demuestran conocimiento del concepto de alimento orgánico. Adicionalmente, el primer segmento percibe que la agricultura orgánica entrega beneficios éticos a la sociedad y considera que F&V orgánicas son saludables y nutritivos; este grupo tiene una probabilidad de más de 80% de consumir F&V orgánicas. El segundo segmento demuestra menos conciencia de los beneficios éticos a la sociedad y su probabilidad de consumir F&V orgánicas, depende del nivel de ingreso familiar. Otras implicancias son discutidas para estudios posteriores en consumidores de alimentos orgánicos.

Palabras clave

frutas y verduras orgánicas • comportamiento del consumidor • análisis multivariante • segmentación • Chile

INTRODUCTION

General background for the Chilean organic market

Worldwide sales of organic products have grown by 20.6% in the last four years. According to the International Federation of Organic Agriculture Movements (IFOAM), the organic market in 2010 was US\$ 59.1 billion (43), with a growth rate of over 10% in the last five years as a consequence of consumer concerns due to food scares and technological advances (*e. g.* genetic modification and irradiation) (32).

In Chile the organic sector is still small and the domestic market is quite limited. According to Lernoud (2008), 90% of Chilean organic food production is exported, while the rest is sold as conventional products. Chilean statistics show

that 126,331 hectares were managed organically during the 2011/12 agricultural season. Almost 90% of the land dedicated to organic production is wild harvest, pasture and fallow land. The most important organic crops are berries (mainly blueberries and raspberries), which represent 40% of the total land area dedicated to organic crops (4,736 hectares). Currently, at least 500 farms grow organic F&V, located mainly in Maule and Bio-Bio Regions (Central Chile, Maule Region 34°41'S and the Bio-Bio Region 36°S) (31).

The domestic Chilean market for organic food is starting to develop through points of sale and trade fairs and is generating an important market opportunity. As incomes have increased,

consumers have adopted life styles similar to developed countries. Also, with global information, consumers are becoming more demanding since *per capita* GDP in Chile has risen from US\$ 6,238 in 2004 to US\$ 14,394 in 2011, while the unemployed rate has decreased from 10.6% in 2009 to 6% in 2012 (44). The growing demand and production of organic products in Chile generated a new legislation that regulates food production, processing, labeling and marketing. This legislation mainly addresses the creation of the National System of Certification for Organic Agricultural Products, which has been in force since January 17, 2007 (23). This organic norm not only encourages the development of a domestic market of organic F&V but also regulates certification firms, labeling, exports and the agricultural production. Despite this potential market, scientific information is scarce about consumer behavior and market segmentation in Chile.

Variables that determine the purchase of organic food

Consumers demand healthy and high quality foods which are produced in an environmentally friendly manner. These characteristics are positive food differentiation perceived by consumers. However, global demand for organic food is concentrated in North America and Europe, representing 96% of global revenues, while Africa and Latin America are the major producers and exporters of organic foods (43). The international literature reveals that consumer concerns about health, product quality, and environment are the main motivations to purchase organic foods. The order of the variables depends on cultural and/or demographic elements (5, 17, 20, 37, 40).

Consumer concerns about health can be traced back to food scares (*e. g. Bovine Spongiform Encephalopathy*, pesticide poisoning, *E. coli* and gene modification) and thus have stimulated interest in organic foods (38, 46). Several studies with different methodologies have concluded that health is a significant factor in determining the choice to consume organic food (17, 26, 38, 42).

Product quality is the other key variable considered by consumers. Freshness, taste, process-based qualities, certification and other elements are highlighted in the literature (13, 14, 30, 34, 41, 47). Also, consumers consider organic production systems more environmentally friendly, avoiding the health hazards of chemical pesticides used in conventional agriculture (1, 3, 34, 46). Another variable that increases the organic food consumption is the level of knowledge about these products, which improves attitudes and the probability of buying organic foods (3, 17, 40).

Most studies have reported that price is the main barrier to purchasing organic food in developed countries (6, 11, 29). Also, low income is a critical barrier to purchasing organic products (6, 17, 42). Most of the studies are concentrated in developed countries and the literature of consumer behavior in organic product in developing countries is limited. This research attempts to identify the variables that segment potential consumers of organic F&V in export-oriented countries, using Chile as a case of study for the South American sector.

MATERIALS AND METHODS

Sample and data

The data used in this study were generated from a personal survey applied in the cities of Talca and Curicó, Maule Region (35°25' S, 71°40' W) using the mall

intercept technique. The Maule Region is the second largest producer of organic foods in Chile (31). Talca has a population of 201,797 and Curicó 119,585 inhabitants (N > 100000 inhabitant, Census, 2002).

The sample was drawn by first randomly selecting 207 valid interviews in the city of Curicó and 218 valid interviews in Talca.

A total of 425 consumers over 18 years of age were interviewed; this sample size is statistically representative of the population under study at the 5% level of confidence with a 5% sampling error.

The questionnaire was validated through a preliminary test with 10% of the sample using the mall intercept technique. In April and May 2010, surveyors approached people near to banks, stores and supermarkets in the main plazas of the two cities.

Since the organic food market is not well developed in Chile, and even less so in the cities of our study, we focus most questions on determining consumers' awareness of organic F&V and on identifying potential consumers for organic products.

The survey was structured in three sections of closed questions, based on the results of earlier research (16, 17, 26, 38). The first section covered the interviewees' knowledge about organic F&V (*Are you familiar with organic F&V?*). Consumers were asked for the *Definition of organic F&V*. Four definitions were offered, one true and three false, which filtered out false consumers. In addition, in this section we evaluate the willingness to consume and buy organic F&V (table 1, page 197).

The second section (table 2, page 198) considered respondents' opinions about:

Consumer behavior related to nutrition and life style

The statements were based on the scale adapted from Gil *et al.* (16) and Sánchez *et al.* (2000). Respondents were asked about their nutritional habits and life styles. Statements 1 to 11 were used to assess the scale.

Perceived benefits of organic F&V as a purchasing criterion

The statements were based on the scale adapted from Magnuson *et al.* (26). Interviewees were asked about the benefits of organic F&V through statements 12 to 17.

Consuming organic F&V

The respondents were asked about the likelihood of consuming organic F&V, which was assessed by statements 18 to 22. This section was adapted from an earlier study by Gracia and De Magistris (2008).

Interviewees were asked to indicate their level of agreement with the statements using a five-level Likert scale, in which 1 represented "totally disagree" and 5 "totally agree" (table 2, page 198).

The third section included information about gender, age, marital status, family size, educational level, occupation, and family income of the respondents (table 1, page 197).

Statistical analysis

Since the scales described in the above section have not been studied in South America, we applied an exploratory factor analysis (EFA) in the sub-sample Curicó and subsequently a confirmatory factor analysis (CFA) in Talca. EFA and CFA should use different dataset (19). EFA was determined through a maximum likelihood, and the adequacy was assessed with Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity (18, 25).

Table 1. Characterization of the sample (N = 425) of potential organic F&V consumers.
Tabla 1. Caracterización de la muestra (N = 425) de los potenciales consumidores de frutas y verduras orgánicas.

Variables	Category	Percentage (%)
Gender	Female	54.4
	Male	45.6
Marital status	Single	35.1
	Married	52.5
	Widowed	2.3
	Divorced	10.1
Family size	One	9.6
	Two	12.7
	Three or four	52.7
	More than four	25.0
Age (Years)	18 to 37	42.4
	38 to 65	54.4
	More than 65	3.2
Educational level	Primary	4.5
	Secondary	24.2
	Vocational school	29.2
	University	42.1
Family income per month	< US\$ 630	18.8
	US\$631 to US\$1,258	28.9
	US\$1,259 to US\$1,890	25.9
	US\$1,891 to US\$2,520	12.0
	US\$2,521 to US\$3,150	8.9
	>US\$3,150	5.4
Are you familiar with organic F&V?	Yes	55.8
	No	44.2
For you, organic F&V are	produced without pesticides	37.6
	gen modified	2.1
	cultivated on water	6.8
	no answer	53.4
Do you consume organic F&V?	Yes	46.6
	No	53.4
If the organic F&V has the same characteristics than conventional F&V. Would you prefer organic F&V?	Yes	61.6
	No	38.4
Do you prefer to buy organic F&V...?	in bulk	41.4
	packed	58.6
Would be willing to buy organic F&V in...?	supermarket	52.9
	trade fair	25.6
	specialized shops	16.7
	minimarkets	4.8

Table 2. Characterization of the statements in the full sample (N = 425).**Tabla 2.** Caracterización de las afirmaciones en la muestra completa (N = 425).

Statements		Cities			
		Curicó		Talca	
		Mean	S. D.	Mean	S.D.
1	I control salt intake	4.15	1.19	3.54	1.36
2	I practice a vegetarian diet	3.55	1.41	2.09	1.08
3	I do exercise regularly	3.88	1.28	3.49	1.31
4	I try to eat unprocessed foods	4.23	1.08	3.50	1.15
5	I eat frequently fruit and vegetables	4.57	0.84	4.33	0.87
6	I eat red meat intake in moderation	4.06	1.29	3.63	1.24
7	I try to eat foods without additives	4.36	1.06	3.72	1.14
8	I check ups my health frequently	3.65	1.52	2.90	1.48
9	I try to reduce my stress	4.33	1.08	4.14	0.97
10	I try to have an organized and methodical lifestyle	4.40	0.95	4.02	1.08
11	I try to keep equilibrium between work and private life	4.51	0.81	4.37	0.93
12	Organic F&V protect personal health	4.58	0.73	4.64	0.52
13	Organic F&V protect agriculture	4.52	0.79	4.28	0.85
14	Organic F&V protect environment	4.62	0.67	4.60	0.55
15	Organic F&V grant business opportunities for farmers	4.36	0.84	3.96	0.97
16	Organic F&V protect farmerworker health	4.61	0.70	4.57	0.58
17	Organic F&V have best flavour and quality	4.46	0.79	4.29	0.88
18	If organic F&V have a nice appearance and attractive price. Probably I buy it.	4.60	0.72	4.39	0.78
19	When you buy organic F&V. You would like that the package to provide information about origin and production	4.67	0.71	4.66	0.55
20	Supermarkets are a great place to buy organic F&V	4.39	1.02	3.41	1.38
21	When I buy organic F&V. I pay attention on origin production (regional. national. international)	4.33	1.07	3.85	1.15
22	In relation to purchase intention to organic F&V. It is important for you the external attributes (color, size, defects)	4.67	0.66	4.74	0.58

Cronbach's α was included to measure the internal consistency of the analysis (18, 25).

The CFA parameters were estimated by maximum likelihood.

The goodness of fit of the CFA model was assessed through χ^2/df (< 3), RMSEA (< 0.08). AGFI indexes can vary from 0 (poor fit) to 1 (perfect fit), GFI (> 0.8), CFI (close to 1) and Holter (over 200) (8).

In addition, we determined the convergent validity and the reliability of the latent variables and the construct through Cronbach's α (8, 18, 25).

Once the factors were obtained, the decision-tree methodology was used with the CHAID algorithm (Chi-squared Automatic Interaction Detection) to determine the variables that segment potential organic F&V consumers.

The most significant multinomial splits of a set of independent variables are established using a Bonferroni controlled Chi-squared statistic with a *p-value* of 0.05 (7, 21).

The model was structured as follows: *Organic F&V consumption* was used as the dependent variable (425 interviewees), where "0" are respondents who had never consumed organic F&V and "1" are respondents who had consumed organic F&V at least once.

The independent variables were the factors obtained through CFA and the classification questions such as gender, age, educational level, and family income (table 3, page 200).

RESULTS

Descriptive analysis

Table 1 (page 197) shows the main sociodemographic characteristics of the respondents. 54.4% are women, which are likely the primary food shoppers for their households.

The majority of the sample is married, with family sizes of around three to four members.

The highest share is 38 to 65 years of age and has monthly incomes below US\$ 1,258, while 5.4% of the sample has monthly incomes above US\$ 3,150. 42.1% had completed university education. Finally, 37.6% know the meaning of organic product.

Exploratory factor analysis

The exploratory factor analysis (EFA) was rated by 207 interviewees in Curicó who had been asked to read 22 statements.

The EFA reduced the number of variables of the scales used by Gil *et al.* (2000), Gracia and De Magistris (2008), Magnuson *et al.* (2003) and Sánchez *et al.* (2000).

Communalities < 0.4 were removed from the analysis and statements with loadings greater than 0.5 were included in a factor.

The KMO was 0.840, which indicates a good fit of the data to the factorial model. Bartlett's test of sphericity was significant ($0.000 < 0.05$; Chi-square = 951,681; d.f.= 36) (18).

We adopted two factors with eigenvalues greater than 1 to explain 9 original variables. Of the total variance, 58.9% was explained by the two factors.

The results of an exploratory factor analysis left aside the remaining variables.

The internal consistency of the scale was assessed by Cronbach's α 0.896 for Factor 1 and 0.730 for Factor 2 (table 4, page 200).

Confirmatory factor analysis

The second database (the city of Talca, $n = 218$) was used with a CFA. This analysis was performed with nine items obtained with EFA.

Table 3. Definition of the variables used in the CHAID model.**Tabla 3.** Definición de las variables utilizadas en el modelo CHAID.

Variable name	Variable definition
Dependent variable	
Organic F&V consumption	0 = if the respondent never had consumed organic F&V 1 = if the respondent had consumed organic F&V
Independent variables	
Definition about organic F&V	1 = Food produced without pesticides
	2 = Food grown on water
	3 = GM foods
	4 = Food produced with pesticides
Latent variables	
Factor 1: Ethical benefits	Benefits perceived by consumers toward society and environmental. Factor scores
Factor 2: Healthiness and nutrition	Consumers worried for their health and nutrition have positive attitude toward organic F&V. Factor scores
Sociodemographic	
Gender	0 = if the respondent is man
	1 = if the respondent is female
Age	Age of the interviewee. Scale 1 to 3 (1: 18 to 37; 2: 38 to 67; 3: more than 68)
Educational level	Education level of interviewee. Scale 1 to 4 (1: Primary; 2: Secondary; 3: Vocational school; 4: University)
Income level	Income perceived by family group per month. Scale from 1 to 6 where 6 means higher level of income

Table 4. Exploratory factor analysis conducted with maximum likelihood extraction.**Tabla 4.** Análisis factorial exploratorio realizado con extracción de máxima verosimilitud.

Variables		Factors	
		F1	F2
1	Environmental protection	0.863	
2	Farmerworker health protection	0.833	
3	Protection of human health	0.774	
4	Agricultural protection	0.756	
5	Trying to eat foods without additives		0.837
6	Trying to eat unprocessed foods		0.827
7	Eating frequently fruit and vegetables		0.603
8	Eating red meat intake in moderation		0.571
9	Practicing a vegetarian diet		0.564
	Variance (%)	30.56	28.34
	Cronbach's alpha	0.896	0.730

The two-dimensional structures could be validated with a good fit of the factorial model ($\chi^2/df = 1.652$, RMSEA = 0.055, AGFI = 0.927, GFI = 0.966, CFI = 0.976, Holter = 205). The model and its standardized estimates are presented in figure 1.

The parameters estimated by the model were all positive and significantly different from zero, indicating the convergent validity of the model (18) (table 5, page 202).

The first factor was termed "ethical benefits" of organic agriculture and is composed of four items that characterize the ethical benefits consumers perceive for society and the environment.

The reliability of the factor was examined through construct reliability (0.799) and Cronbach's α (0.827), which indicated good homogeneity and internal consistency.

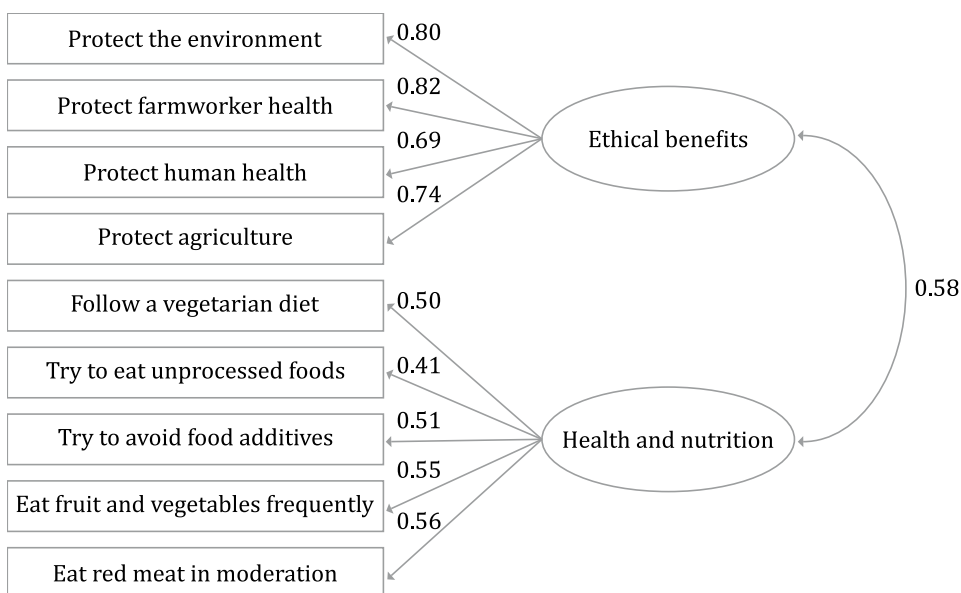


Figure 1. Confirmatory factor analysis for the perceptions of potential organic food consumers.

Ovals represent latent variables or factors, while rectangles represent observed variables. One-headed arrows represent predictive values between factors and observed variables. Two-headed arrows represent correlations between factors and observed variables.

Figura 1. Análisis factorial confirmatorio de las percepciones de los potenciales consumidores de alimentos orgánicos.

Óvalos representan variables latentes o factores, mientras que los rectángulos representan variables observadas. Flechas de una cabeza representan valores predictivos entre factores y variables observadas. Flechas de doble cabeza representan correlaciones entre factores y variables observadas.

Table 5. Standardized factor loading for potential organic F&V consumers.

Tabla 5. Cargas factoriales estandarizadas para los potenciales consumidores de frutas y verduras orgánicas.

Item	Factor loading	t-value
Environmental protection	0.817	10.950
Farmerworker health protection	0.797	11.160
Agricultural protection	0.745	10.950
Protection of human health	0.693	9.605
Eating red meat intake in moderation	0.558	4.617
Trying to eat unprocessed foods	0.552	3.502
Trying to eat foods without additives	0.509	3.872
Practicing a vegetarian diet	0.502	4.443
Eating frequently fruit and vegetables	0.412	4.617

The second factor was composed of five items and was termed "health and nutrition". It characterized consumers who consume health foods and are worried about their health.

The reliability of this factor reported through construct reliability was 0.831 which indicates good homogeneity and Cronbach's α was 0.673.

Although the reliability of the factor 2 did not reach the value of 0.7, according to Hair *et al.* (1999) Alpha-values to 0.6 are accepted on exploratory studies.

Segmentation

The results of the classification tree are shown in figure 2 (page 203), where the *organic F&V consumption* is the dependent variable. Socio-demographic variables and construct obtained with confirmatory factor analysis are the explanatory variables.

The four descriptors splitting the nodes are: definition about organic F&V; ethical benefits; health and nutrition and family income. The other variables were excluded from the analysis because no relationships between independent and dependent variables were found. In this

regard, Node 0 shows that from all respondents ($n = 425$) 46.6% consumed organic F&V at least once.

Then in Node 1 (first splitting variable) the likelihood of consuming organic F&V increased to 67.5% if the respondents were familiar with the concept. At this level the Nodes 2 and 3 depict the respondents who were not familiar with the concept of organic food.

The second splitting variable was an understanding of the organic product concept (from Node 1). This variable distinguished between respondents with more and less appreciation of the ethical benefits of organic agriculture (Nodes 4 and 5, respectively).

The likelihood of consuming organic F&V increased to 76.3%, if the respondents perceived ethical benefits of organic agriculture (Node 4).

Conversely, the probability of using organic F&V decreased to 55.1% (Node 5) if consumers perceived less ethical benefits associated to these products. Consumers that were better informed about organic F&V had a broader understanding of the ethical benefits of organic agriculture than those who lack information.

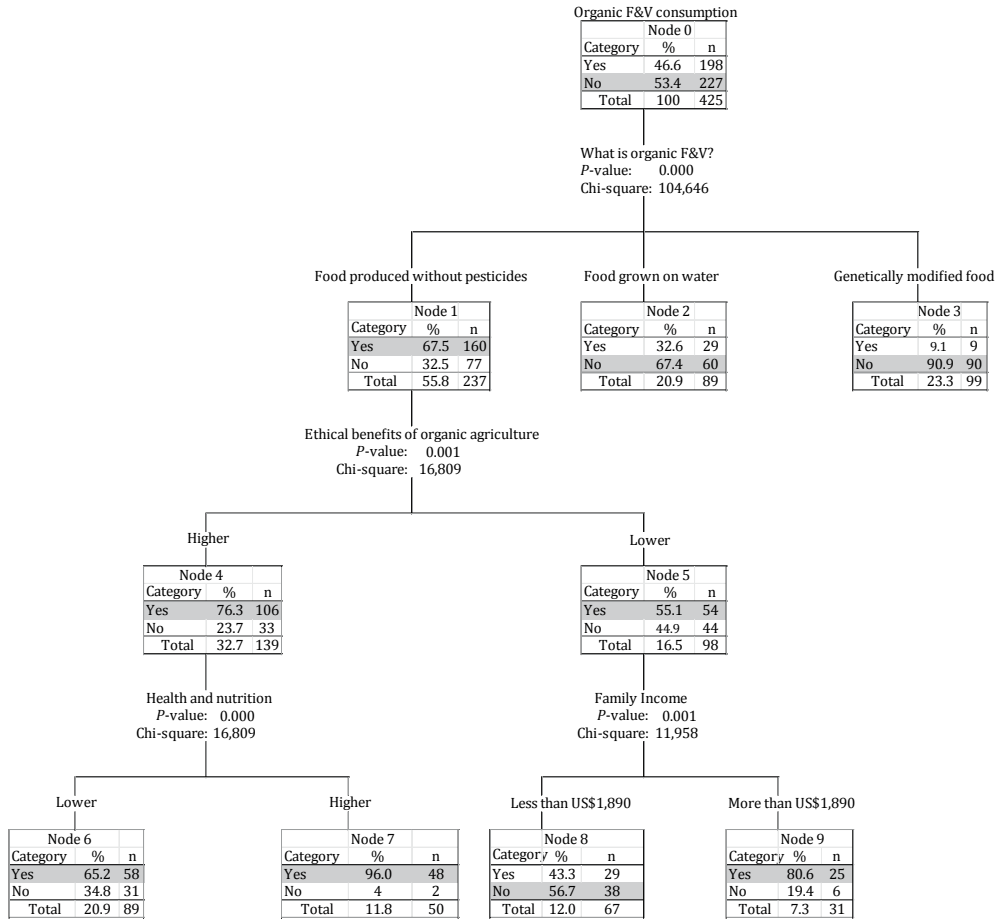


Figure 2. Distribution for the 2 segments based on the variables interaction in Talca and Curicó cities.

Figura 2. Distribución de los 2 segmentos, basada en la interacción de variables en las ciudades de Talca y Curicó.

The third splitting variable (Node 4) is composed of consumers that perceived the health and nutritional benefits of organic F&V and it included two consumer groups. This variable distinguished the respondents with higher and lower levels of appreciation of the health and nutritional benefits of organic F&V (Nodes 6 and 7).

The likelihood of consuming organic F&V was to 65.2% if the respondents perceived to a lesser extent the health and nutritional benefits of organic food (Node 6). Conversely, the probability of using organic F&V increased to 96% if the respondents perceived higher health and nutritional benefits of organic food (Node 7).

On the other hand, Node 5 (respondents who perceived lower ethical benefits of organic agriculture) diverged into Nodes 8 and 9. A 43.3% probability to consume organic F&V was observed in the consumers with lower perception of ethical benefits of organic agriculture and who earned less than US\$1,890 per month (Node 8). Conversely, for consumers who earned over US\$1,890, the odds of using organic F&V increase to 80.6% (Node 9). The CHAID model correctly classified about 75% of the cases.

DISCUSSION

The study identifies the variables that segment potential organic F&V consumers in an export-oriented country, using Chile as a case study. The EFA identified two constructs, which were confirmed with CFA and named ethical benefits and health and nutrition. Through a CHAID model, two segments were identified based on demographic variables and the identified constructs.

Our findings revealed that in Chile the population considers that *ethical benefits* are ethical and altruist motivations. This means that the organic agriculture

is perceived as an environmentally-friendly production system that maintains the natural attributes of products, highlighting the benefits of this type of agriculture to society and the environment (1, 5, 17, 26, 27, 28, 33).

In addition, our findings revealed that there is a second important dimension to the population named *health and nutrition*. This finding draws attention to a segment of consumers who are worried about their health and diets, and present a positive attitude toward the potential purchase of organic F&V (egoist motivations). This is in line with Gracia and De Magistris (2008); Lima-Filho *et al.*, (2012); Smith and Paladino (2010); Wier *et al.*, (2008) and Yin *et al.*, (2010), who found that consumers highlight the importance of eating foods that do not harm human health, such as organic F&V.

The latent dimensions described above, such as *Ethical Benefits* and *Health and nutrition*, prevailed in this research, which could be explained by the global information available for consumers.

The results reveal that the first barrier to consume organic F&V is being familiar with the concept of organic food. If consumers are not familiar with the concept they will not know the attributes of organic food.

Thus, it is necessary to inform consumers about the benefits of organic foods (20).

If the organic food concept is not rooted, the theory of planned behavior is interrupted and consumers cannot develop the hierarchical process of acceptance, preference and purchasing intention toward organic F&V (4, 15).

In this context, it is necessary to establish a promotional campaign, highlighting the main attributes of organic F&V. For example, Adasme-Berríos *et al.* (2013)

suggest that television is the most important medium for encouraging F&V consumption, especially in people influenced by advertising.

In the second level of segmentation, the results of the model show that altruistic motivations (*ethical benefits*) are above egoist motivations (*health and nutrition*) as a predictor of consuming organic F&V. This finding in our model contrasts with that of the study of Magnuson *et al.* (2003) who stated that egoistic motives are better predictors than altruistic motives of the decision to purchase organic F&V. However, our results are in line with the findings of Padilla Bravo *et al.*, (2013), who argues that altruism is the most important factor determining the perceived importance of organic food and purchasing behavior.

The factor health and nutrition (in the third segmentation level) shows the potential consumer group that is most interested in consuming organic foods.

Various studies have shown that consumers believe that organic food is healthier and more nutritious than conventional products (12, 20, 26, 35). However, the scientific literature is not sufficiently consistent in this aspect (33).

Thus, studies are needed to determine the real contribution of organic food to human health. At the same level of segmentation, the results of the model show that low family income is a real barrier to greater access to organic F&V.

People with low incomes have limited access to organic foods. Several authors have found empirical evidence that supports this finding. For example, Hughner *et al.* (2013) argued that personal disposable income is a critical factor for purchasing organic foods. Therefore, we can consider that income is positively related to the probability of buying organic foods (17, 39, 45).

Additionally, the propensity to purchase organic food tends to increase with social status, which is associated with higher incomes of consumers (42).

However these results are not in line with Zepeda and Li (2007), who found a negative relationship between income and organic food demand, because in the US organic food represents a small percentage of food expenditures, especially among higher-income households. In addition, Cerda *et al.* (2011, 2012) in their study about organic apple and organic table grapes in Chile found that consumers irrespective of income level show a higher willingness to pay for these fruits, which further supports the idea that the latent variables found in this study (Ethical benefits and Health and nutrition) can act as organic purchase decision making criteria, establishing a market niche.

CONCLUSIONS

Chile is a producer of export-oriented organic food and has a domestic organic market that is taking shape, due to the rising demand of local consumers. Therefore, potential organic F&V consumers are familiar with the concept of organic food. Nevertheless 53.4% of interviewees had never consumed organic food and 62.4% were unfamiliar with the concept (265 over 425 respondents). For that reason the producers, decision-makers, educators, retailers and wholesalers should support the diffusion of the organic concept, its attributes and the benefits associated with this form of agriculture.

Two segments of potential consumers of organic F&V were identified. The first has (on average) a probability of over 80% to consume organic F&V if these are perceived as healthy and nutritious,

accompanied by consumer perception of ethical benefits to society and if the concept of organic food is known by consumers.

Conversely, the probability of consuming organic F&V decreases to 43% in persons who earn less than US\$1,890 per month and at the same time perceive fewer ethical benefits for the society,

despite their familiarity with the concept of organic foods.

The main limitation of this study is that the results cannot be generalized to the whole population of Chile because results from other regions are needed to generate a broader understanding of consumers that purchase organic food.

REFERENCES

1. Adasme-Berrios, C.; Rodríguez, M.; Jara-Rojas, R.; Díaz-Tobar, B. 2011. Dimensiones que caracterizan el consumo potencial de alimentos orgánicos en la Región del Maule, Chile. *Revista de la Facultad de Ciencias Agrarias. Universidad Nacional de Cuyo.* 43: 59-69.
2. Adasme Berríos, C., Jara-Rojas, R., Ramos-Cabello, B., Rodríguez, M., & Mora, M. 2013. Consumer responses to agricultural produce advertising in the O'Higgins Region of Chile. *Ciencia e Investigación Agraria.* 40: 31-41.
3. Aertsens, J.; Mondelaers, K.; Verbeke, W.; Buysse, J.; Van Huylenbroeck, G. 2011. The influence of subjective and objective knowledge on attitude, motivations and consumption of organic food. *British Food Journal.* 113: 1353-1378.
4. Ajzen, I. 1991. The Theory of Planned behavior. *Organizational Behavior and Human Decision Process.* 50: 179-211.
5. Aldonado-Ochoa, M.; Almanza-Sáez, C. 2009. The private provision of public environment: Consumer preferences for organic production systems. *Land Use Policy.* 26: 669-682.
6. Batte, M. T.; Hooker, N. H.; Haab, T. C.; Beaverson, J. 2007. Putting their money where their mouths are: Consumer willingness to pay for multi-ingredient, processed organic food products. *Food Policy.* 32: 145-159.
7. Biggs, D.; De Ville, B.; Suen, E. 1991. A method of choosing multiway partitions for classification and decision trees. *Journal of Applied Statistics.* 18: 49-62.
8. Byrne, B. M. 2010. 2° ed. *Structural equation modeling with AMOS: Basic concepts, applications, and programming.* Routledge. 396 p.
9. Cerda, A.; García, L.; González, J.; Salvatierra, A. 2011. Preferencias y disposición a pagar por uva de mesa orgánica en la región del Maule, Chile. *Revista Brasileira de Fruticultura,* 33: 784-790.
10. Cerda, A.; García, L.; Ortega-Farías, S.; Ubilla, Á. 2012. Consumer preferences and willingness to pay for organic apples. *Ciencia e Investigación Agraria.* 39: 47-59.
11. Chang, J. B.; Lusk, J. 2009. Fairness and food choice. *Food Policy.* 34: 483-491.
12. Chrysosoidis, G. M.; Krystallis, A. 2005. Organic consumers' personal values research: Testing and validating the list of values (LOV) scale and implementing a value-based segmentation task. *Food Quality and Preference.* 16: 585-599.
13. Dal Bianco, A.; Boatto, V.; Caracciolo, F. 2013. Cultural convergences in world wine consumption. *Revista de la Facultad de Ciencias Agrarias. Universidad Nacional de Cuyo. Mendoza. Argentina.* 45(2): 219-231.
14. Echeverría, R.; Moreira, V. 2013. Factors that influence the decision to produce exportables in the Chilean agricultural sector. *Revista de la Facultad de Ciencias Agrarias. Universidad Nacional de Cuyo. Mendoza. Argentina.* 45(1): 185-197.
15. Engle, C.; Kouka, P.-J. 1995. Potential consumer acceptance of canned bighead carp: A structural model analysis. *Marine Resource Economics.* 10: 101-116.
16. Gil, J. M.; Gracia, A.; Sánchez, M. 2000. Market segmentation and willingness to pay for organic products in Spain. *International Food and Agribusiness Management Review.* 3: 207-226.
17. Gracia, A.; De Magistris, T. 2008. The demand for organic foods in the South of Italy: A discrete choice model. *Food Policy.* 33: 386-396.

18. Hair, J.; Anderson, R.; Tatham, R.; Black, W. 1999. 5° ed. Análisis Multivariante. Prentice Hall International Inc. 832 p.
19. Henson, R. K.; Roberts, J. K. 2006. Use of Exploratory Factor Analysis in Published Research: Common Errors and Some Comment on Improved Practice. *Educational and Psychological Measurement*. 66: 393-416.
20. Hughner, R. S.; McDonagh, P.; Prothero, A.; Shultz II, C.; Stanton, J. 2007. Who are organic food consumers? A compilation and review of why people purchase organic food. *Journal of Consumer Behaviour*. 6: 94-110.
21. Kass, G. 1980. An exploratory technique for investigating large quantities of categorical data. *Journal of the Royal Statistical Society*. 29: 119-127.
22. Lernoud, P. 2008. Organic farming in Latin America. In Willer, H. and M. Youssefi-Menzler, N. Sorensen. *The world of organic agriculture, statistics and emerging trends*. IFOAM - FiBL Report. IFOAM, Bonn; FiBL, Frick; ITC, Geneva. Suizerland. 166-186.
23. Ley_20.089. 2006. Crea Sistema Nacional de Certificación de Productos Orgánicos Agrícolas. *Diario Oficial de la República de Chile, Santiago (Chile)*, 17 Enero 2006.
24. Lima-Filho, D.; Quevedo-Silva, F.; Lezcano Foschaches, C. 2012. A profile of the Brazilian consumers of organic products. *African Journal of Business Management*. 6: 6939-6947.
25. Luque, T. 2000. Técnicas de análisis de datos en investigación de mercados. Ediciones Pirámide. 557 p.
26. Magnuson, M.; Arvola, A.; Koivisto, U.; Aberg, L.; Sjöden, P. 2003. Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite*. 35: 130-139.
27. Michaelidou, N.; Hassan, L. 2008. The role of health consciousness, food safety concern and ethical identity on attitudes and intentions towards organic food. *International Journal of Consumer Studies*. 32: 163-170.
28. Michaelidou, N.; Hassan, L. 2010. Modeling the factors affecting rural consumers' purchase of organic and free-range produce: a case study of consumers' from the Island of Arran in Scotland, UK. *Food Policy*. 35: 130-139.
29. Napolitano, F.; Braghieri, A.; Piasentier, E.; Favotto, S.; Naspetti, S.; Zanolì, R. 2010. Effect of information about organic production on beef liking and consumer willingness to pay. *Food Quality and Preference*. 21: 207-212.
30. Nie, C.; Zepeda, L. 2011. Lifestyle segmentation of US food shoppers to examine organic and local food consumption. *Appetite*. 57: 28-37.
31. ODEPA. 2013. *Agricultura Orgánica Temporada 2011-2012*. Oficina de Estudios y Políticas Agrarias (ODEPA), Ministerio de Agricultura, Santiago, Chile. Available at <http://www.odepa.cl/odepaweb/publicaciones/doc/10186.pdf> (accessed May 2013).
32. Olivas, R.; Bernabéu, R. 2012. Men's and women's attitudes toward organic food consumption. A Spanish case study. *Spanish Journal of Agricultural Research*. 10: 281-291.
33. Padilla Bravo, C.; Cordts, A.; Schulze, B.; Spiller, A. 2013. Assessing determinants of organic food consumption using data from the German National Nutrition Survey II. *Food Quality and Preference*. 28: 60-70.
34. Pearson, D.; Henryks, J.; Jones, H. 2010. Organic food: What we know (and do not know) about consumers. *Renewable Agriculture and Food Systems*. 26: 171-177.
35. Roitner-Schobesberger, B.; Darnhofer, I.; Somsook, S.; Vogl, C. R. 2008. Consumer perceptions of organic foods in Bangkok, Thailand. *Food Policy*. 33: 112-121.
36. Sánchez, M.; Gil, J. M.; Gracia, A. 2000. Segmentación del consumidor respecto al alimento ecológico: diferencias interregionales. *Revista de Estudios Regionales*. 56: 171-188.
37. Schnettler, B.; Sepúlveda, N.; Sepúlveda, J.; Orellana, L.; Mirand, H.; Lobos, G.; Mora, M. 2014. Consumer preferences towards beef cattle in Chile: Importance of country of origin, cut, packaging, brand and price. *Revista de la Facultad de Ciencias Agrarias. Universidad Nacional de Cuyo. Mendoza. Argentina*. 46(1): 143-160.
38. Smed, S. 2012. Information and consumer perception of the 'organic' attribute in fresh fruits and vegetables. *Agricultural Economics*. 43: 33-48.
39. Smith, T.; Huang, C. L.; Lin, B.-H. 2009. Does Price or Income Affect Organic Choice? Analysis of U.S. Fresh Produce Users. *Journal of Agricultural and Applied Economics*. 41: 731-744.

40. Smith, S.; Paladino, A. 2010. Eating clean and green? Investigating consumer motivations towards the purchase of organic food. *Australasian Marketing Journal*. 18: 93-104.
41. Valenciano J. P.; Giacinti Battistuzzi M. A. 2014. Complejidad en el comercio mundial de peras. *Revista de la Facultad de Ciencias Agrarias*. Universidad Nacional de Cuyo. Mendoza. Argentina. 46(1): 125-141.
42. Wier, M.; O'Doherty Jensen, K.; Mørch Andersen, L.; Millock, K. 2008. The character of demand in mature organic food markets: Great Britain and Denmark compared. *Food Policy*. 33: 406-421.
43. Willer, H.; Kilcher, L. 2012. *The World of Organic Agriculture - Statistics and Emerging Trends 2012*. Research Institute of Organic Agriculture (FiBL), Frick, and International Federation of Organic Agriculture Movements (IFOAM). Bonn, Germany. 340 p.
44. World-Bank. 2013. World Data Bank. Available at <http://search.worldbank.org/all?qterm=chile> (accessed September 2013).
45. Yin, S.; Wu, L.; Dub, L.; Chena, M. 2010. Consumers' purchase intention of organic food in China. *Journal of the Science of Food and Agriculture*. 90: 1361-1367.
46. Yiridoe, E. K.; Bonti-Ankomah, S.; Martin, R. C. 2005. Comparison of consumer perceptions and preference toward organic versus conventionally produced foods: A review and update of the literature. *Renewable Agriculture and Food Systems*. 20: 193-205.
47. Zagata, L. 2012. Consumers' beliefs and behavioural intentions towards organic food. Evidence from the Czech Republic. *Appetite*. 59: 81-89.
48. Zepeda, L.; Li, J. 2007. Characteristics of Organic Food Shoppers. *Journal of Agricultural and Applied Economics*. 39: 17-28.

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