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CONSUMER PREFERENCES FOR ORGANIC FOOD: BEHAVIOR BUILDING-UP, IMPORTANCE OF PRICING, INFORMATION AND SENSORY ISSUES

Tesis doctoral presentada

por

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SUMMARY

The aim of this thesis is to investigate Spanish consumers purchase motivations and behavior towards organic food by means of determining the key factors that take part on building their behavior. An important contribution of this work consists on providing more evidence on consumers' underlying motivations to buy organic food for the particular case of Spain and to test the role of sensory "experience" in defining individual new WTP for a post purchasing situation.

This thesis investigates the role of personal, economic and social elements in predicting Spain consumers' attitudes and purchase intentions toward organic food. It place together all the relevant variables identified by previous studies developing a new and complex behavioral model on consumers' organic decision making process. The new conceptual model is developed and tested via structural equation modeling. Results show that attitudes, knowledge, as well as environmental and health concern partially mediates the effects of trust in market agents and risk perceptions on attitudes toward organic food. Furthermore, price and subjective norms have been detected to explain organic food purchase intention.

Next, this thesis analyzes the factors affecting consumer's willingness to pay (WTP) for organic food. In this context, the most widely used valuation methods have been Conjoint Analysis and Choice Experiments. However, discrete choice and conjoint data do not offer immediate financial consequences for the participants. As a consequence, consumers tend to overestimate their real WTP. For that reason, this thesis investigates approaches to incorporate incentives into the traditional conjoint and choice methodologies. In this research, we analyze the "Calibrated Auction-Conjoint Valuation method" (CACM), by comparing Non-adjusted values from a self-explicated conjoint method to the final calibrated values entered using a non-hypothetical auction in a context well suited to the CACM: preferences for sustainable farming. We noticed that consumers significantly reduced their WTP when moving from the initial stage of the CACM to the final stage, primarily by placing less importance on product prices, implying that WTP values from a self-explicated conjoint method used alone would likely lead to overstated estimates of WTP.

Finally, consumers' willingness to pay and sensory "experience" is assessed through an experimental auction. Two auctions have been designed: the first consists on consumers' evaluation of different food options based on search attributes (before purchase) and the second after tasting it (simulating a post purchasing situation). In between a hedonic sensory test is performed. Simultaneously, as a complementary exercise, a trained panel sensory test has been employed to identify the main organoleptic characteristics that consumers associate with the hedonic taste satisfaction. Finally, factors affecting consumers' WTP differences in the two auctions are analyzed. We have detected that the Spanish consumers have a positive attitude towards sustainable food due to environmental concerns, health concerns, and trust in certification and market agents. However, the premium they are willing to pay for these products is lower than the current market price. Furthermore, both "search" and sensory "experience" do influence consumers' purchase behavior.

RESUMEN

El objetivo de esta tesis es investigar las motivaciones de compra de los consumidores españoles y el comportamiento hacia los alimentos ecológicos por medio de la determinación de factores clave que intervienen en la construcción de su comportamiento. Una contribución importante consiste en proporcionar más evidencia a la ya existente en España sobre las motivaciones subyacentes de los consumidores para comprar alimentos ecológicos, así como determinar el rol de la experiencia sensorial en la generación de las nuevas disposiciones a pagar una vez comprado el producto.

En esta tesis se investiga el papel de elementos personales, económicos y sociales en la predicción de las actitudes e intenciones de compra hacia los alimentos ecológicos de los consumidores de España. Se sitúan todas las variables identificadas en estudios previos desarrollando un complejo modelo del comportamiento de los consumidores de alimentos ecológicos en el proceso de toma decisión. Un modelo conceptual es desarrollado y probado a través de modelos de ecuaciones estructurales. Los resultados muestran que las actitudes de conocimiento, así como la preocupación del medio ambiente y la salud media parcialmente los efectos en la confianza en los agentes del mercado y las percepciones de riesgo a las actitudes hacia los alimentos ecológicos. Por último, las normas subjetivas y el precio explican la intención de compra.

Además en esta tesis se analizan los factores que afectan la disposición a pagar de los consumidores alimentos ecológicos. En este contexto, los métodos de valoración más utilizados han sido el análisis conjunto y experimentos de elección. Sin embargo, la elección discreta y el conjunto de datos no ofrecen consecuencias financieras inmediatas para los participantes. Como consecuencia, los consumidores tienden a sobreestimar su verdadera disposición a pagar. Debido a lo anterior, esta tesis estudia métodos para incorporar incentivos en las metodologías tradicionales de elección y el conjunto de datos. En esta investigación se analiza el "Calibrated Auction-Conjoint Valuation Method" (CACM), mediante la comparación de los valores no ajustados a partir de un método *conjunto auto-explicado* a los valores finales calibrados participando en una subasta hipotética, en un contexto muy adecuado para el CACM: las preferencias para la agricultura sostenible. Hemos encontrado que los consumidores redujeron significativamente su

disposición a pagar cuando se pasa de la etapa inicial del CACM a la etapa final, principalmente mediante la asignación de menor importancia en los precios de los productos, lo que implica que los valores de la disposición a pagar de utilizando solamente un método de *auto-explicado conjunto* podría llevar a estimaciones exageradas de la disposición a pagar.

Por último, la disposición a pagar de los consumidores se determina mediante una subasta experimental. Dos subastas se han diseñado: la primera consiste en la evaluación de los consumidores de las opciones de diferentes alimentos en función de atributos de búsqueda (antes de la compra) y el segundo después de probarlo (simulando una situación post-compra). Entre las dos apuestas se lleva a cabo una prueba sensorial hedónica. Al mismo tiempo, como un ejercicio complementario, una prueba sensorial con un panel entrenado se realizó para identificar las principales características organolépticas que los consumidores asocian con la satisfacción hedónica del gusto. Finalmente, para determinar los factores que afectan las diferencias en la disponibilidad a pagar de los consumidores se analizan dos subastas. Se encontró que los consumidores españoles tienen una actitud positiva hacia la comida producida de manera sostenible debido a las preocupaciones ambientales, problemas de salud, y la confianza en la certificación y los agentes del mercado. Sin embargo, la prima que están dispuesto a pagar por estos productos es menor que el precio del mercado actual. Por otra parte, existe una la influencia clara de los atributos intrínsecos del producto (tipo de producción, etc), y la "experiencia" sensorial en el comportamiento de compra del consumidor.

Dedicated to my wonderful husband Saúl, my mother Guadalupe, my father Armando and my brother Jesús. Thanks for all your love and support. You are the most important of my life. Thank you for being a wonderful family.

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CHAPTER 1

Introduction and objectives

1.1 Justification and objectives

During the last century European agriculture has intensified its production practices partially financed by the European Common Agricultural Policy (CAP) (Gardner, 1992 and 2002; Rude, 2001). This strategy responds to technological development incentives and profit maximization policies among other reasons, implying greater focus on continuous farming systems, increasing the use of farm inputs as well as irrigated lands or employing highly productive varieties. As a result, yields have been increased with some environmental side effects such as contamination of surface and ground water and loss of biodiversity due to the reduction of natural habitats, among other costs. These externalities arising from the intensification of conventional agriculture did have important effects on human health, animal welfare, and especially on the environment.

Recently, society is gaining consciousness on the effects of intensive farm production and slowly shifting attention to a more sustainable consumption. Consequently, consumers are increasing their interest towards alternative farming practices such as organic agriculture, placing sustainable agriculture as an interesting alternative for consumption (Chen, 2007). Sustainable agriculture can be defined as a way of production that causes less degradation of the agro-ecological system than conventional agriculture (Quenum, 2010). Organic farming has been identified as a production system that combines the best environmental practices and the application of high-animal welfare standards, as well as prohibiting the use of synthetic agrochemicals, drugs and hormones and restricting the use of chemical fertilizers and pesticides which must be replaced by techniques that use agronomic, biological and mechanical methods adapted to local conditions and need (Magistris and Gracia, 2008; Michaledou and Hassan, 2009; Miret, 2004).

Organic agriculture emerged in northern European countries during the beginning of the last century. Its development has been marked by various schools of thought which differ according to the politics and socioeconomic situation of the country as well as to the demands from producer and consumer organizations and associations. Until the early 70's, organic agriculture in the European Union (EU) was merely symbolic, occupying less than 10,000 hectares. In the 80's, its importance started to increased in response to the growing environmental concerns that emanated from the United Nations Conference on the Human

Environment held in Stockholm in 1972. Although still very marginal, organic agriculture started to gain producers attention, market share and to be in the interest of certain consumer groups.

It was during the 90's when the organic agriculture experienced the strongest growth in Europe due to the confluence of three factors: 1) the integration of environmental considerations into the design of CAP policies (dissemination of information and subsidies to the conversion to organic agriculture); 2) the cumulative effects of a series of food scares that took place in the EU (bovine spongiform encephalopathy, salmonella, dioxins, etc.,); and 3) the conventional agriculture economic crisis, which led many farmers to seek for alternatives in order to stay in agriculture (Rigby et al., 2001).

Despite its spectacular growth in recent years, the potential development of the organic market has been affected by the following factors: the export orientation of the Spanish producers, and.

1) The existence of significant higher prices in relation to conventional products. Price differences between conventional and organic food varies greatly across countries, product types and degree of transformation (Michelsen et al., 1999). For products such as fruits and vegetables, organic surplus may vary between 50% and 100% compared to the conventional price and sometimes up to 150% (Thompson, 1999; Glaser and Thompson, 1999), while for dairy products premiums differs from 15% to 50% (Menghi, 1997; Glaser and Thompson, 2000).
2) The lack of availability in conventional retail outlets (more than 50% of organic food is sold in dietetic outlets) (Yiridoe et al., 2005).
3) The population lack of knowledge about what exactly organic farming is (Tarkiainen and Sundqvist; 2006; Fotopoulos and Krystallis, 2002).

As a consequence, the consumption of organic food at the EU level has developed much slower than production. In the most outstanding countries, organic food consumption represents around 5% of the total food budget. In the case of Spain, this percentage hardly arrives at 1% (MAPA, 2009). This lower percentage could be partially explained by the export orientation of Spanish producers, looking for higher rice premia in foreign markets.

However, during the last year the information is available (2010), global sales of organic food grew by 11.7%, indicating that there is still place for further development of a potential market for organic agriculture in Spain (MAPA, 2009), which could be higher if the above mentioned limitations are overcome. In any case, the achievement of that potential will require a deeper understanding of the determinants of the demand for organic food, which is precisely the main aim of this work.

Food decision-making process is a complex phenomenon to analyze, since it constitutes a significant part of everyday life of individuals. This process is determined by: 1) sensory aspects of food such as taste, smell and texture, achieved by means of personal experiences (Shaw et al., 2007); 2) non-food elements such as, available information or environmental and social factors (Bell and Meiselman, 1995; Eertmans et al., 2001; Rozin and Tuorila, 1993; Shaw et al., 2007); and 3) cognitive factors, which emphasize the development of mental structures and processes that may vary among individuals (Magistris and Gracia, 2008; Peter and Olson, 2005).

While previous literature has mainly focussed on partial analysis related to the factors mentioned above, the literature trying to provide an overall picture of the global consumer's purchasing decision process related to organic food is very limited (Zanoli anda Naspeti, 2002; Chryssohoidis and Krystallis, 2005; Padel and Foster, 2005; Yiridoe et al., 2005; Kuhar and Juvancic, 2005; Chen, 2007; Poleman et al., 2008). One of the main objectives of this thesis is to find out the role of each specific factor in the behavioral process or mechanism that determine consumer attitudes and purchase intentions towards organic food by jointly considering in a unique methodological framework (Structural Equation Models) all factors detected in previous literature. We aim at investigating Spanish consumers purchase motivations and behavior towards organic food by means of determining the key factors that take part on building their behavior. An important contribution consist on provide more evidence on consumers' underlying motivations to buy organic food to already evidence in Spain.

The last step in the consumer's making decision process if purchasing intention, which usually has been measured through the consumer's Willingness-to-pay (WTP) a premium over conventional food counterparts. That is, the true value of the product justifies the price

premium and the prices paid over (Krystallis and Chryssohoidis, 2005 and Rao and Burgen, 1992). Indeed, the increasing number of individuals who are willing to pay more for environmentally friendly products is the most convincing evidence of favorable consumer support for the growth of organic products (Laroche et al., 2001).

This is, precisely, the second main objective of this study: to analyze factors affecting consumer's WTP for organic food. In this context, the most widely used valuation methods have been Conjoint Analysis and Choice Experiments. However, discrete choice and conjoint data do not offer immediate financial consequences for the participants. As a consequence, consumers tend to overestimate their real WTP. For that reason, researches have investigated approaches to incorporate incentives into the traditional conjoint and choice methodologies. Incentive-compatible elicitation mechanisms can be categorized into two general categories: experimental auctions and non-hypothetical discrete choice experiments (Corrigan et al., 2009; Lusk and Shogren, 2007; Lusk and Schroeder, 2004). One of the main advantages of experimental auctions is that they place subjects in an active market environment where they can learn and adjust to market conditions. In addition, bids provide researchers an explicit estimate for each participant's WTP without the need to estimate an econometric model. Non-hypothetical choice experiments incorporate incentives into the traditional conjoint by randomly selecting one of the several repeated choices between competing product profiles as the biding. The participant purchases the product indicated as most preferred in the randomly selected choice set (Alfnes et al., 2005; Carlsson and Martinsson, 2001; Ding, et al., 2005; Ding, 2007; Lusk and Schoroeder 2004; Lusk et al.; 2008).

The upside of non-hypothetical choice experiments is that they are easy for people to answer, being more similar to the choices people make in the marketplace. The downside is that choice experiments can require sophisticated experimental designs and econometric estimates to drive WTP estimates. In this thesis, we have followed the approach suggested by Norwood and Lusk (2011) that combines the strengths of conjoint and auction elicitation methods in a procedure that promotes systematic and rational behavior; the so called Calibrated Auction Conjoint valuation Method (CACM).

Most of the previous literature dealing with WTP for organic food has been focussed in ex-ante decisions, that is, when consumers are evaluating alternative purchasing choices. However, only a few have focussed on post purchasing decisions, that is, after tasting the product. Although there is a vast literature dealing with consumers' WTP for organic foods, as well as about the role of sensory attributes in the food choice (e.g. Cardello and Schutz, 2006; Ishii et al., 2007; Gil et al., 2000; Krystallis and Chryssohoidis, 2005; Batte et al. 2007), this study is the first attempt to combine both experiments, WTP and sensory tests for the case of organic food, which is the third main objective of this thesis. Previously, Poole and Martínez (2006 and 2007) and Combris et al. (2009) showed the importance of experience attributes on individuals quality perception of food and on the final food choice.

To achieve this third objective, consumers' willingness to pay is assessed through an experimental auction. Two auctions have been designed: the first consists on consumers' evaluation of different food options based on search attributes (before purchase) and the second after tasting it (simulating a post purchasing situation). In between a hedonic sensory test is performed. Simultaneously, as a complementary exercise, a trained panel sensory test has been employed to identify the main organoleptic characteristics that consumers associate with the hedonic taste satisfaction. Finally, factors affecting consumers' WTP differences in the two auctions are analyzed.

Taking into account the three main goals mentioned above, the specific objectives of this study are:

1. To know the motives that determine Spanish consumer attitudes towards organic food and the influence of the attitudes in final consumers purchase intentions of organic food.
2. To understand to what extent consumers' knowledge on organic food do have an influence on their decision making process towards organic food consumption.
3. To identify to what extent consumers confidence on organic food dealers and retailers influence consumers intention towards organic food.
4. To examine, if risk perception derived from conventional agricultural affects consumers' attitude and purchase intention toward organic food.

5. To investigate consumer preferences for sustainable farming. We compare the hypothetical and non-hypothetical valuations to explore the internal consistency of people's behavior.
6. To identify the relevance of the price attribute versus agro-ecosystems preservation in the market for organic fresh products.
7. To identify the influence of the sensory characteristics in building consumers' willingness to pay for sustainable products.
8. To verify the importance of consumer lifestyle like health and environmental concerns etc., for the formation of individual's organic food choice.
9. Finally, the influence of social pressure, which is subjective norms, on consumers purchase intentions.

1.2 Thesis structure

To achieve the above mentioned objectives the thesis has been structured in three main chapters, each of one trying to address the three main goals. Moreover, each chapter aims at contributing to the existing literature dealing with consumer behavior related to organic food.

The first chapter focuses on the definition of a theoretical decision making model which allows researchers to explain the different phases that constitutes consumers decision making process for organic food. The model is based on an exhaustive literature review and uses the structural equation model approach to test the theoretical relations. An important contribution to the literature is that we examine the influence of knowledge, trust on dealers and retailers, and perceived risk on the consumer attitudes toward organic food and finally in the purchase intention. In this chapter, the structural equation models have become in a powerful tool able to explain the interrelationships that determine the consumer choices.

The second chapter is addressed at analyzing the consumers' WTP for organic food. The apple market is taken as the case study and comparisons are made between to ways of sustainable agriculture: organic and integrated production. To achieve this objective, we have adapted the recent methodological approach developed by Norwood and Lusk (2011), called Calibrated Auction Conjoint Valuation Method (CACM). The main contribution here is that in addition to linking

the auction bids with the conjoint rating to investigate consumer preferences for sustainable farming, we compare the hypothetical and non-hypothetical valuations to explore the internal consistency of people's behavior and the relevance of the price attribute versus agro-ecosystems preservation in the market for organic and integrated apples. Furthermore, we complete the experiment with a survey to determine factors that explain changes in consumer WTP when using hypothetical versus non-hypothetical valuation methods.

Finally the third chapter aims at identifying the influence of consumption experience (sensory skills) on consumers' WTP for organic and integrated apples. We combine experimental auctions and sensory tests to identify the role of experience attributes in shaping consumers WTP for organic products.

This thesis ends with a final chapter addressed to answer to the main objectives mentioned in the previous section. Additionally, before starting with the three chapters, this introduction will offer an overview about the organic market both at World, European and Spanish levels.

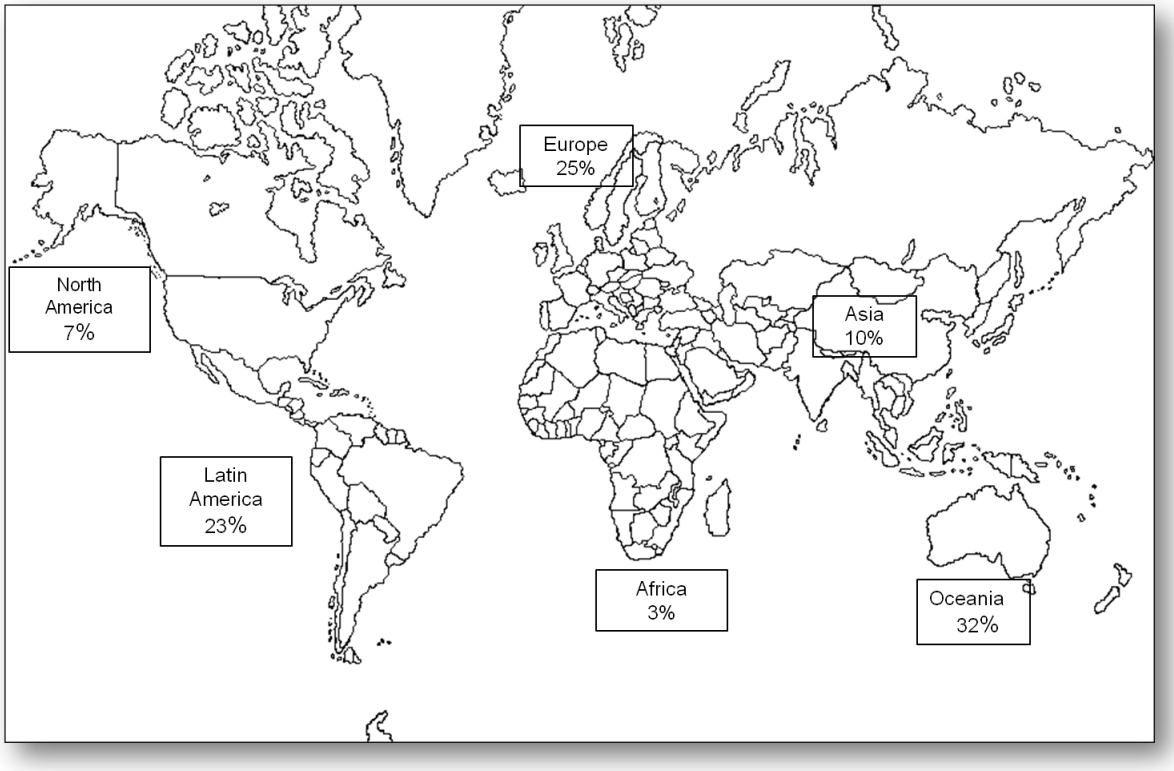
1.3 An overview about the organic market

1.3.1 World production of organic food.

The organic market can be considered as one of the fastest growing markets within the food industry worldwide (Shaw et al., 2007). Consequently, it is hard to provide accurate estimates about the market size of organic products. In late 2003, worldwide land devoted to organic agriculture was estimated at 26.5 million hectares, increasing in about 69% compared with 1998 (Mc Donald, 2001). In 2006, nearly 30.4 million hectares were devoted to organic farming, which constituted 0.65% of total agricultural land in the countries considered in the SOEL-FiBL survey (Foundation Ecology and Agriculture) - (Research Institute of Organic Agriculture). More recently, in the last survey realized by SOEL-FiBL, in 2011, it was reported that worldwide about 37.2 million of hectares were devoted to organic farming, which constitutes approximately a 0.9% of global agricultural land.

The continent with more hectares devoted to the organic farming is Australia (Oceania), with about 12.2 million of hectares, followed by Europe, with 9.3 million of hectares, Latin America, with 8.6 million of hectares, Asia, with 3.7 million of hectares, North America, with 2.6 million of hectares and, finally, Africa, with 1.1 million of hectares (Figures 1.1 and 1.2).

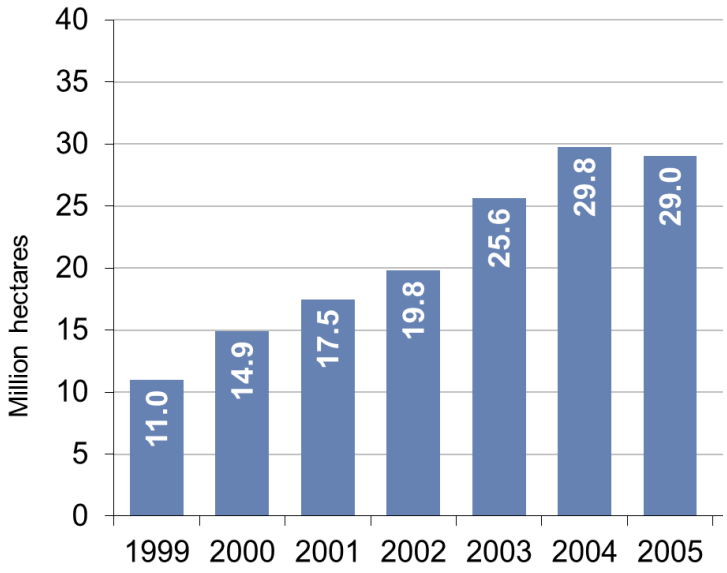
Figure 1.1 Geographical distribution of the area under organic products.



Source: SOEL – FiBL, 2011

Regarding to worldwide global market for certified organic food and drink, it has been estimated a sales value of about 40 billion Euros in 2009. In addition, the associated global benefits derived from organic food sales have increased around 43% since 2002. The two biggest organic markets are Europe (48.1%) and North American (47.9%) (FiBL, 2009). However, despite this demand and sales growth, the organic food market can be still considered as marginal.

Figure 1.2 World: Development of organic agricultural land 1999-2009



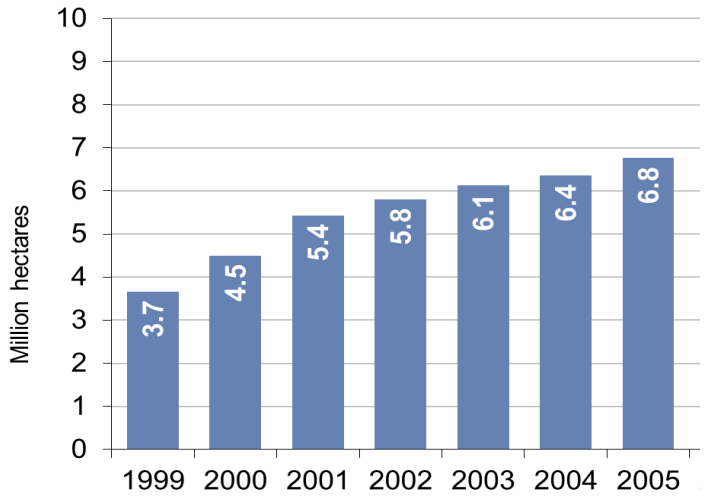
Source: FiBL, IFOAM and SOEL 2000-2011

1.3.2 Organic food within EU

Although organic farming has an important tradition within Europe, it was not until the 90's when a major shift towards organic farming was experienced up to achieve 9.3 million of hectares in 2009 (Figure 1.3). Within Europe, the country with the highest surface devoted to organic farming is Spain, with 1.33 million of hectares, followed by Italy with 1.11 million of hectares and, finally, Germany with 950, 000 hectares (Figure 1.4).

As regards to the market share, organic food sales in the Europe market were estimated at 18,400 million Euros in 2009. The largest market for organic products in 2009 was Germany with an annual income of 5,800 million Euros, followed by France (3,041 million Euros) and U.K. with 2,065 million of Euros (FiBL, IFOAM and SOEL, 2011; Eurostat, 2009). The country whit a higher per capita consumption of organic consumer is Denmark with 139 Euros per year, followed by Switzerland with 132 Euros per capita.

Figure 1.3 Europe: Development of organic agricultural land 1999-2009



Source: FiBL, IFOAM and SOEL 2000-2011

Figure 1.4 Europe: Organic agricultural land by country 2009

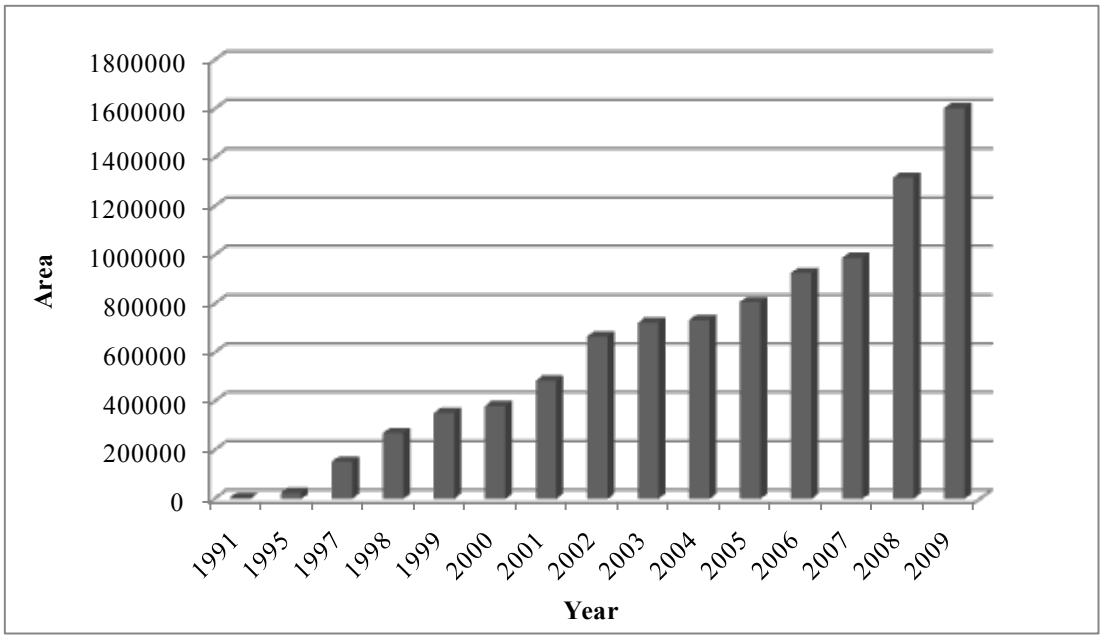
Source: FiBL, IFOAM and SOEL 2011

Regarding EU marketing channels, the picture is country-specific. In some countries the main distribution channels are direct commerce and specialty stores (Belgium, Germany, Greece, Fra nce, Luxemburg, Ireland, Italy, Holland and Spain). However, in countries like Denmark, Finland, Switzerland, United Kingdom, Hungary and Check Republic the most important share is through traditional retailers, such as supermarkets (Rhoner-Thielen, 2005).

1.3.3 The Organic market in Spain and Catalonia

In 2009, Spain had 1.22 million of hectares devoted to organic farming (61.96% was qualified as organic farming, 21.05% was qualified as "in conversion" to organic farming and the remaining 17% were qualified as "in the first year of practices") (MAPA, 2010). Figure 1.5 shows the rapid grow of organic farming in Spain between 1991 and 2009.

Figure 1.5 Evolution of organic production in Spain (1991-2009)



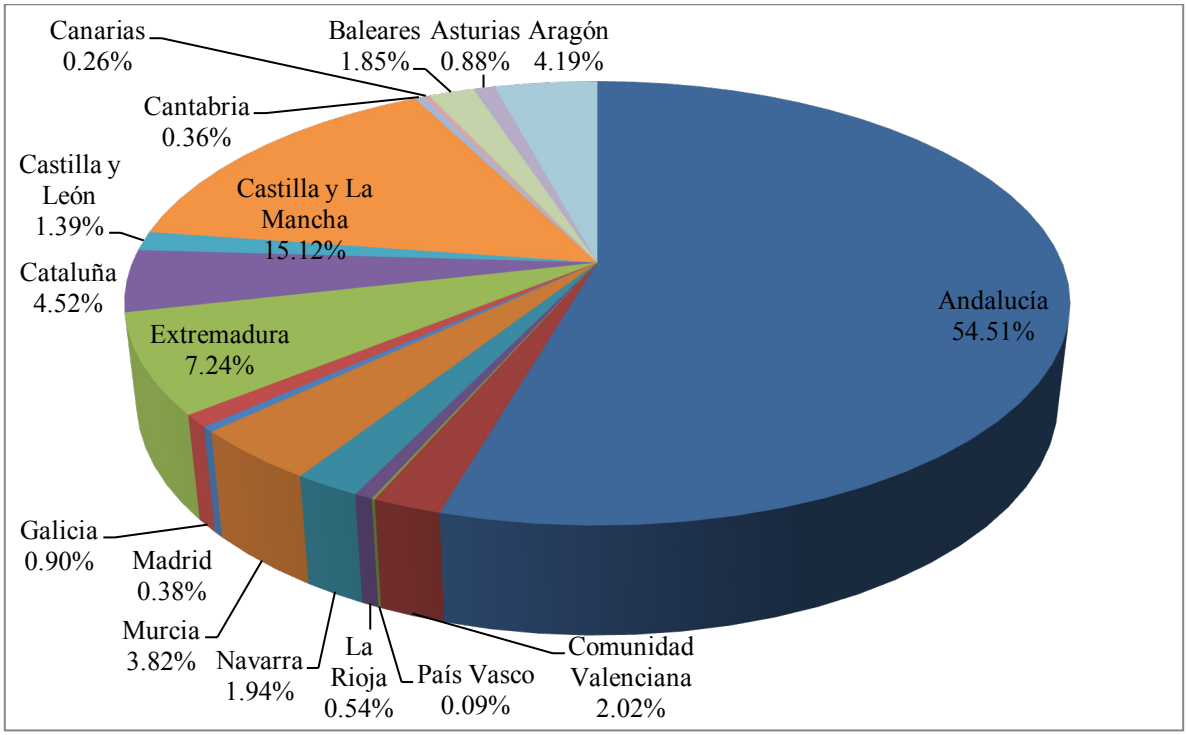
Source: MAPA (2009)

Figure 1.6 shows the geographical distribution of the area devoted to organic farming in Spain. The community with the higher organic farm area is Andalucía, followed by Castilla-La Mancha and Extremadura. Furthermore, Andalucía also plays a key role on the

organic food industrial processing occupying the first place with 398 industries, followed by Catalonia with 229, Castilla-La Mancha and Castilla-León are also important.

Specifically, Catalonia plays an important role in the Spanish organic food market representing 4.48% of Spanish geographical area devoted to organic farming. In addition, it occupies the second place in cattle farms and food industry (MAPA, 2010; GENCAT, 2010).

Figure 1.6 Geographical distribution of organic farming area in Spain



Source: MAPA, 2010

Despite the growing trend in Spanish organic production, the market segment for organic food is still low. The volume of organic products represents about 0.22% of the total food budget (around 37 million Euros) (MAPA, 2010). Currently, between 70 and 80 percent of Spanish organic food production is exported to Germany, UK, France, Sweden and Italy.

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CHAPTER 2

Structural equation modelling of consumer acceptance of organic food in Spain.

ABSTRACT

This chapter investigates the role of personal, economic and social elements in predicting Spain consumers 'attitudes and purchase intentions toward organic food. It place together all the relevant variables identified by previous studies developing a complex behavioral model on consumers' organic decision making process. A conceptual model is developed and tested via structural equation modeling on a sample of 338 consumers. Results show that attitudes toward organic food can be explained by risk perception and trust in market agents and institution. Knowledge, as well as environmental and health concern partially mediates the effects of trust in market agents and risk perceptions to attitudes toward organic food. And finally, price and subjective norms explain purchase intention.

2.1 Introduction

An increasing literature on consumers' behavior currently focus on the environmental challenges that rose from last century until today – wetlands threats, ocean pollution and fish scarcity, global warming, water scarcity and pollution, genetic engineering impact on land and ecosystems, etc. These challenges together with "food safety" worries are currently addressing the question of the new "consumerism" and its influence on human health and on the long-term maintenance of the planet's resources (Silverstone, 1993; Krysatallis and Chryssohoidis (2005).

Focusing in agriculture, one of the main questions that have arisen in the public debate has been the relationship between intensive production and its environmental influences (Zilberman, et al., 1999). As a consequence, there has been an increasing interest among agronomic and social scientists about sustainable agriculture as an appealing alternative for consumption (Chen, 2007, FACUA, 2008). Sustainable agriculture can be defined as a way of production that causes less degradation of the agro-ecological system than conventional agriculture (Quenum, 2010). To achieve this objective, stricter environmental regulations have been developed which, in some cases, have not been very welcome by some producers as they represent cost increases and income and product competitiveness reductions (Zilberman et al., 1999).

In Spain, the two more important applications of the concept of sustainable agriculture are organic farming and integrated production. Organic farming has been identified as a production system that combines the best environmental practices and the application of high-animal welfare standards, prohibiting the use of synthetic agrochemicals, drugs and hormones and restricting the use of chemical fertilizers and pesticides (Magistris and Gracia, 2008; Michaledou and Hassan, 2009; Miret, 2004). Worldwide land devoted to organic farming has experienced a growth during the last decade, with a total of 37.2 million hectares in 2009. However, only a quarter is devoted to cropped area (Lockie et al., 2004; Michaledou and Hassan, 2009; Willer and Kilcher, 2011). The geographical areas with larger amounts of land allocated to organic production are Oceania, Europe and Latin America. Within Europe, Spain is the country with the higher number of hectares allocated to organic production (Willer and Kilcher, 2011), with about 25,000 producers and 1.6

million ha, which represent 0.58% of the total agricultural land (FASTAT, 2009). Organic land growth has exceeded 25% annually (Willer and Yussefi, 2008; Briz and Ward, 2009; Willer and Kilcher, 2011).

In addition to the land allocated to organic agriculture, the market value for organic food and feed has also increased during the last years. Europe domestic sales of organic food and feed in 2008 were estimated at 18 billion Euros, with Germany (almost 6 billion Euros), France (more than 3 billion Euros), U.K. (almost 2 billion Euros) and Italy (almost 1.5 billion Euros) the most outstanding countries (Willer and Kilcher, 2011). In Spain the market accounts for only 905 million Euros (MAPA, 2007; Michaledou and Hassan, 2009; Willer and Kilcher, 2011). This can be explained because, although devoting a significant share of arable land to organic production, this is mainly concentrated in crops such as almonds, olive trees and vineyards planted in non-irrigated areas. Moreover, most of the Spanish production is exported. In fact, Italy and Spain concentrate more than the 87% of the European export market for organic food and feed, 900 and 315 million Euros, respectively (Willer and Kilcher, 2011).

The figures mentioned above show that the Spanish domestic market for organic food has room for potential growth. Previous studies have detected some brakes for potential growth: the existence of relatively high price premia for organic food, the export orientation of the Spanish producers, the lack of availability in conventional retail outlets (more than 50% of organic food is sold in dietetic outlets) and the population lack of knowledge about what exactly organic farming is (Tarkiainen and Sundqvist; 2006; Fotopoulos and Krystallis, 2002). Therefore, a better understanding of the consumers' behavioural process for organic food purchasing as well as consumers' awareness on organic production is needed in order to advice Spanish organic producers and trade agents on their domestic marketing strategies.

A number of studies dealing with organic food consumption have focused on the relative importance of price as the main determinant for future demand. The main objective of such studies has been to measure consumer's WTP as a premium over conventional product prices (Mann et al., 2012). That is, the true value of the product justifies the price premium and the prices paid over (Krystallis and Chryssohoidis, 2005; Rao and Bergen, 1992).

Indeed, the increasing number of individuals who are willing to pay more for environmentally friendly products is the most convincing evidence of favorable consumer support for the growth of organic products (Laroche et al., 2001).

However, the consumer's purchasing decision process in relation to food is rather complex and previous studies on WTP issues only provide a partial picture. Food purchasing constitutes a significant part of individuals' everyday life. This process is mainly determined by cognitive factors, which emphasize the development of mental structures and thoughts, and which may vary among individuals due to elements as culture, ideology, family structure, education and so on (Magistris and Gracia, 2008; Peter and Olson, 2005; Bellows et al., 2010).

Previous work has noticed some of the factors that influence individuals' attitudes and WTP towards organic food, such as some direct relations between WTP and individuals' lifestyles, socio-economic characteristics or environmental concerns. Laroche et al., (2001) argue that consumer attitudes towards the environment are very good predictors for organic food purchasing. Krystallis and Chryssoidis (2005) shown that consumers are highly fragmented in terms of their level of environmental awareness and willingness to choose higher-priced environmental friendly products. In the same way, Tarkianen and Sunqvist (2006) observe that healthy diet, balanced life and organic knowledge are elements that influence individuals' attitudes towards organic food. Furthermore, these authors also perceive a causal relation between attitudes towards the environment and purchase intention of organic food. Likewise, Chen (2007) conclude that not only exists a relation between individuals' organic food choice and individuals' attitude towards environment protection, health, natural content, etc. but also that elements such as the perception of control when purchasing or the influence of social norms are also important in building the intention to purchase organic foods.

More recently, Magistris and Gracia (2008) and Riefer and Hamm (2011) conclude that health consciousness and subjective norms influence attitudes toward organic foods. Particularly, Riefer and Hamm (2011), noticed that organic food consumption in families with adolescents decreases to adapt to juveniles' eating preferences, which is related with social pressure. Knowledge about organic farming and information was also considered by

Napolitano et al. (2010) stressing information as a key element of consumers' organic beef liking in comparison to conventional one. In addition, Siriam and Forman (1993) and Teils et al. (1999) maintain that there is limited information on how many consumers are willing to sacrifice money for such products. The relevance of the parameter knowledge is deeply analyzed by Aertsens et al. (2011) and Pieniak et al. (2010) highlighting the positive impact of objective and subjective knowledge on the behavior towards organic food, noticing a more relevant impact of subjective knowledge. The first work also analyzed the positive impact of social norms, named membership of an "ecological organization", on consumers' knowledge and organic food consumption behavior, revealing as well a positive attitude of Flanders towards organic food. Finally, for the particular case of Spain Gil et al., (2000) exposes that the WTP a premium for organic food products in Spain was almost zero for unlikely consumers. Only likely and regular organic food consumers showed positive attitudes towards organic food, and are willing to pay a premium for their attributes. As can been observed there is a wide range of potential factors determining the consumer's purchasing decision process of organic food, although there seems to exist a consensus that consumers' environmental concerns and food quality/safety consciousness are the main attributes considered by consumers (Krystallis and Chryssohoidis, 2005; Soler et al. (2002).

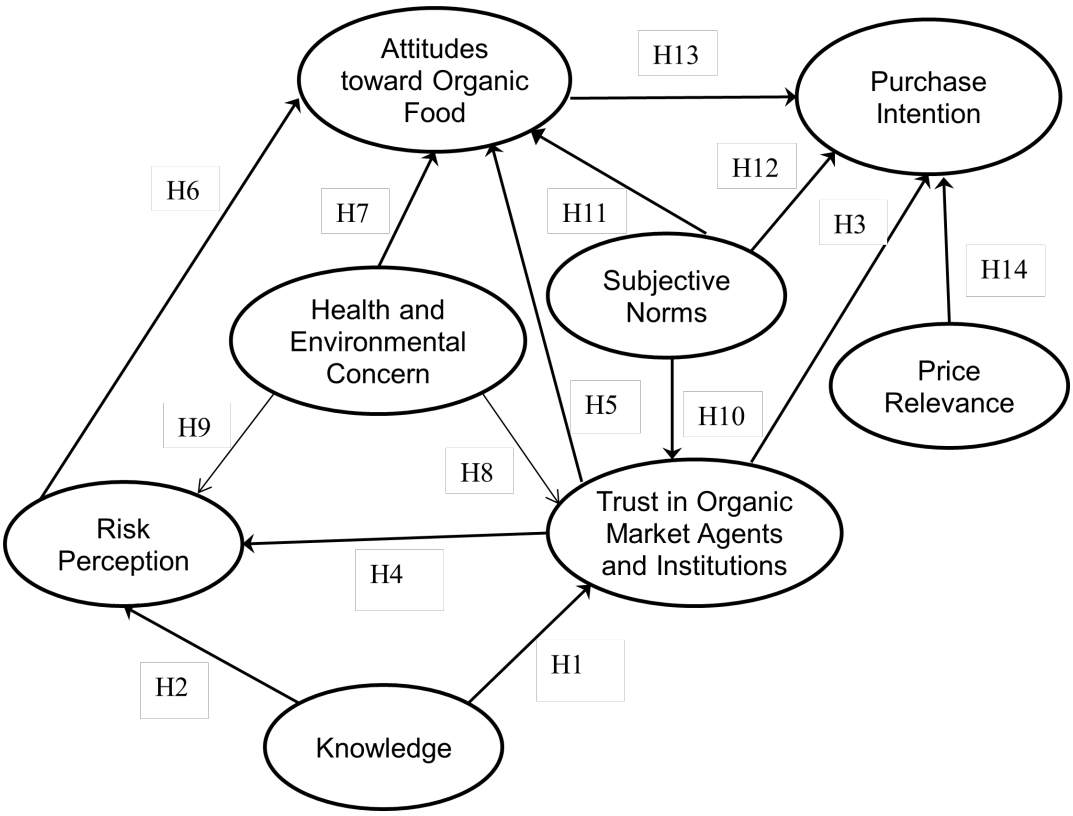
The objective of this study is to find out the role of each specific factor in the behavioral process or mechanism that determine consumer attitudes and purchase intentions toward organic food considering in a single analysis all the factors detected by previous literature. We aim at investigate Spanish consumers purchase motivations and behavior towards organic food by means of determining the key factors that take part on building their behavior. An important contribution consist on provide more evidence on consumers' underlying motivations to buy organic food to already evidence in Europe, specifically in Spain. The empirical results would help local policy makers to establish appropriate strategies to develop the future demand for these products. Besides, another contribution of this work to previous literature is that it puts together both behavioral and social elements such as: the influence of organic food knowledge, trust on organic dealers and retailers, risk perception of conventional agriculture, organic food price, subjective norms and others to better understand the formation of consumer attitudes toward organic food and its final purchase intention.

We have structured the chapter in four additional sections. The first section describes the conceptual model and the research questions. Next, the methodological framework is outlined. The third section is devoted to the results and, finally, the paper ends with some concluding remarks.

2.2 Theoretical framework and hypotheses to be tested

To better understand the behavioural process underlying Spanish organic food consumption we have developed a conceptual model which aims at describing the reasoning process that supports organic food acceptance (see Fig. 2.1). Briefly, it attempts to identify the most influential constructs in the decision making process concerning the organic food purchasing process (health and environmental concerns, trust in organic markets agents and institutions, perceived risk, subjective norms, knowledge, price, attitudes towards organic food and purchase intention).

Fig. 2.1 Consumer conceptual model.



Our basic conceptual framework is primarily based on the Theory of Planned Behavior (TPB) defined by Ajzen (1991), which states that the behavior intention (e.g., purchase intention) is based primarily on three factors: 1) individual's attitudes to participate in the behavior (e.g., purchasing attitude); 2) social pressure with respect to the behavior (subjective norm); and 3) the degree of control that the person feels about performing the behavior (e.g., perceived behavioral control). The first two factors reflect the perceived desirability of conducting a behavior, while the third reflects the perception of whether personal behavior is controllable or not (Chen, 2007). The TPB explicitly recognizes the gap between intention to act and behavior. The TPB allows, then, to analyze the relationships among beliefs, attitudes, normative factors, intention and behavior; relationships that can be expressed in mathematical terms (Ajzen, 1991). The novelty of the present study is the inclusion of new relations achieving an amplification of the TPB with additional components like individuals' environmental and health concerns, conventional agricultural perceived risk, trust in organic market agents, knowledge on organic production and price relevance.

2.2.1 Subjective Knowledge

The concept of consumer knowledge is defined as a measure of the experience and understanding that a consumer has on a specific product before an external search occurs (Alba, 1983; Brucks, 1985; Rao and Monroe, 1988; Sujan, 1985). It is considered a relevant and meaningful construct to the model since it influences how consumers collect and organize information (Alba and Hutchinson, 1987). In addition, it affects how and what consumers decide to buy. There are three main types of knowledge: subjective knowledge, objective knowledge and experience (Dodd et al. 2005). Experience is defined as the sum of the activities related to past consumption of a product, including information search (Alba and Hutchinson, 1987). On the other hand, objective knowledge is defined in terms of real content and organization of knowledge that is in memory. The subjective knowledge has been defined as the individuals' perception about their own knowledge and confidence in themselves (Dodd et al. 2005). The objective and subjective knowledge are interrelated (Raju et al., 1993), as there seems to be a relationship between subjective knowledge and the sources of information used in a purchase decision (Dodd et al. 2005).

Although there is a general awareness about the concept of organic production, the literature also suggests that consumers have inconsistent interpretations about what is 'organic'. Some researchers noticed certain level of uncertainty associated to organic food knowledge and reported a negative influence between these uncertainty on attitude and purchase intention towards organic food (Thøgersen, 2007; Aertsens et al. 2011). For example, in a consumers' survey in three California counties, Jolly *et al.* (1989) found that respondents associated organic production with no pesticides, no artificial fertilizers, no growth regulators, and residue-free products. Similarly, survey respondents in the UK perceived 'organic farming' to imply absence of chemicals, 'absence of growth hormones', and 'not intensively grown' or 'products grown naturally' (Hutchins and Greenhalgh, 1997). In a more recent study for the UK, respondents described organically produced food as one that is more natural and healthy, compared to conventional food (Hill and Lynchehaun, 2002).

Furthermore, it is important to remark that knowledge about organic food may not necessarily imply purchase intention, because of barriers that can limit the ability of consumers to transform such knowledge into actual demand. This is partly because many potential organic consumers, especially in Western industrialized countries, are skeptical about organic labels (Giannakas 2002), stemming from reported cases of mislabeling (e.g.,Bonti-Ankoma and Yiridoe, 2006) and misrepresentation of conventionally produced food as organic (e.g., Groves, 1998). Recently, Padel and Foster (2005) indicate that there is a lack of knowledge about certification and labeling and about the guarantee that organic standards really offer to consumers. This implies a lack of confidence when it comes to claims made about organic food that ultimately will prevent them from buying it.

Finally, the knowledge that consumers believe they have about the potential risks is also very important in defining consumers' perceptions and intention towards food (Stefani, et al. 2008). Siegrist and Cvetkovich (2000) conclude that a relationship exists between knowledge about risk, trust in public authorities and the perception of risk. In the absence of knowledge, confidence in public authorities will increase, while the perception of risk will be lower. The Gianluca's et al. (2008) model raises the hypothesis that risk perception should be affected by the confidence and knowledge about the potential dangers. Results

from this study suggest that a better knowledge about potential risks makes people more aware about them and increases their perception of risk. They also find that risk perception decreases when there is confidence in the distributors. Consequently the hypotheses to be tested are the following:

H1. The higher knowledge consumers have about organic food, the more trust they have on organic market agents and institutions.

H2: The higher is the knowledge about organic food the higher is the perception of risk associated to food production technologies.

2.2.2 Trust in Organic Market Agents and Institutions

An important element in defining consumers' attitudes towards food is confidence. According to Earle and Cvetkovic (1995) and Trumbo and McComas (2003), there are two types of confidence: interpersonal trust and social trust. Interpersonal trust refers to the relationship between information sources and the target audience (trust in sources of information.). By contrast, social trust is a property of the multifaceted social processes underlying people's choices and how people or organizations are assigned responsibilities for the administration (trust in institutions). According to Siegrist, et al., (2000, p. 354), social trust is defined as "the willingness to trust those who are responsible for decisions and actions related to the administration of public health and security".

Another issue affecting the purchase of organic food is the level of trust that consumers have towards the certification of organic products, as consumers seem to distrust about the veracity of the certification (Shaw et. al., 2007). In fact, organic labels seem to be not sufficient for French consumers to pay for organic food, demanding additional information about the use of pesticides (Marette et al., 2012) Distribution, certification and labeling are related in some way with consumers' trust and confidence levels when buying organic food (Aarset et al., 2004; Canavari et al., 2002; Hamzaoui and Zahaf, 2006). In this line, Janssen and Hamm (2012) found that for the case of organic food, consumers are willing to pay a higher premium for those logos "well-known" and with associated higher level of trusts and strict control system.

Lobb et al. (2007) hypothesize a relationship between trust and purchase intention; however, their findings suggest a significant relationship between trust and attitudes towards the consumption of chicken, plus a positive and reciprocal relationship between the level of trust and subjective norms. Also, Dierks and Henning (2006) investigate trust as a determining factor in consumer behavior in Germany and conclude that there is a significant relationship between trust and attitudes. In the same line, Yin et al. (2009) shown that the consumers' degree of trust for organic food has a positive effect on their willingness to purchase.

Some researches (Lobb, et al. 2007; Chen and Li, 2007; Stefanni et al., 2008; Costa-Font and Gil, 2009) propose the inclusion of a set of causal relationships that tries to explain the perceived risk; in particular, that risk perception may be affected by trust. Results from these studies conclude that trust has a negative impact on perceived risk. Therefore, the following hypotheses are proposed.

H3: Consumers that trust on organic market agents and institution have a positive intention to purchase organic food.

H4: Consumers that trust on organic market agents and institutions perceive a lower risk associated to food production.

H5: Consumers that trust on organic market agents and institutions have a positive attitude towards organic food.

2.2.3 Perceived Risk

In 1960 Bauer was the first to propose the idea that consumer behavior should be considered in terms of taking risks (Taylor, 1974). The perceived risk has been analyzed in numerous ways and has been applied to different market segments (Arnold, 2008). Even within the technical-scientific advances or cognitive perspective, risk perception could be regarded as a mere result of beliefs (Lupton, 1999).

The way consumers are coping with the perception of risk can be better understood if the risk is not approached as a one dimension variable but a multidimensional one. The

literature suggests that the perception of risk can be divided into six dimensions: 1) personal and physical risks, 2) economic or financial risks, 3) functional and performance dimensions/risks, 4) risk convenience, 5) social risks, 6) psychological risks (Murray, 1991; Yeung and Morris, 2001). According to Arnold (2008), often these six dimensions are considered independent.

In relation to organic food the six dimensions mentioned above are present: personal risks, because of the benefits and drawbacks for health; financial risk due to the possibility of "premium" prices for organic products; functional risk because people are assessing whether a product meets their expectations (taste, texture); the risk of convenience that comes from having to search for food in specific places, the social risk can occur when the person's circle of friends and relatives are in favor or against organic food; and, finally, the psychological risk of buying organic food involves the way in which the consumer thinks about himself based on purchases made. In summary, organic food can contain all the basic elements of risk perception, so this concept is important and must be addressed within the current research (Arnold, 2008).

Recent research shows that there is a causal relationship between risk perception and buying behavior, being the first an important explanatory variable of the latter (Yeung and Morris, 2001). For example Huang (1993) reports on an empirical study of waste-free products that consumers have a tendency to avoid foods that from their point of view are potentially contaminated. In the model proposed by Gianluca et al. (2008), a hypothesis is established about an occasional relationship between the perception of risk and purchase intention, and conclude that the attitude is determined by beliefs and the perceived risk, indirectly affecting purchase intention. Moreover, Lobb et al. (2007) conclude that in the case of chicken the perception of risk does not appear to affect purchase intention but it does affect attitudes. Therefore the following hypothesis is proposed:

H6: Consumers that perceive more risk associated to agricultural and animal production will have a positive attitude towards organic food.

2.2.4 Environmental and Health Concern

Another personal factor that influences consumers' attitudes is lifestyle. It is understood as the result of an ideology derived from a system of values, especially those that are related to health and the environment, which affect individual assessments, consumer attitudes and behavior (Scheifferstein and Ophiusa, 1998; Cicia et al., 2002).

Fotopoulos and Krystallis (2002) identify that consumers buy organic products because they perceive them as healthier, tastier and safer than the conventional counterparts as they are based on production systems that avoid the use of pesticides, fertilizers, chemicals, preservatives, hormones and antibiotics, among others (Jolly, 1991; Scheifferstein and Ophiusa, 1998; Shaw et. al., 2007, Aertsens et al. 2011). Recent food scares such as bovine spongiform encephalopathy (BSE), salmonella and those relating to genetically modified foods have led certain consumers to buy organic food as a protective and/or preventive measure (Makatouni, 2002; Zanoli and Naspetti, 2002; Kotler et al., 2005; O'Donnovan, 2002; Ougthon and Ritson, 2007).

Another relevant aspect of individuals' lifestyle is the concern for the environment. A positive attitude toward environmental issues is positively related to the purchase of organic food (Grunert and Juhl, 1995). Padel and Foster (2005), Chryssohoidis and Krystallis (2005) and Chen (2007) confirm that attitudes towards the environment have a direct and significant influence on organic food purchasing, although their relative importance is lower than in the case of heath issues. Magistris and Gracia (2008) and Kuhar and Juvanic (2005) arrive to similar conclusions. Therefore the following hypothesis is proposed:

H7: Consumers that have higher environmental and health concern will perceive more differences between organic and conventional food which implies a more positive attitude towards organic food.

H8: Consumers that have higher environmental and health concern will have more trust in organic agents and institutions.

H9: Higher risk perception associated to food production technologies is positively influenced by higher environmental and health concern.

2.2.5 Subjective norms

According to the TPB, the intention to perform or not a behavior is determined by two factors, one personal and one social. In other words, subjective norms are the own perception of the social pressure to perform or not perform a target behavior (Francis et al., 2004). The subjective norm is estimated by: 1) the normative beliefs about the possibility that certain individuals or significant groups expect to play or not a specific conduct, and 2) the individual motivation to satisfy those expectations. Generally, individuals perceive social pressure when they believe that most of their relevant social referents think they should carry out that behavior (Ajzen, 1980; Chen, 2007; Haugtvedt et al., 2008). It means that people try to do something when they believe that it is important to others and therefore think that they should do it (León, 2004).

In any case, subjective norms do not only affect behavior but also attitudes, being this one of the main reasons why some authors have proposed a revision of the TPB. Arvola, et al. (2008), Tarkiainen (2006), Chang (1998), Shepherd and O'Kefee (1984) have found evidence that there is an important causal link between subjective norms and attitudes. Chang (1998) suggests that this link can be explained by the influence of the social environment on the formation of individual attitudes and concludes that subjective norms positively influence the purchase intention through attitudes.

More specifically, Lobb et al. (2007) conclude that there is a significant relationship between subjective norms and attitudes, as well as a positive relationship between trust and subjective norms. Tarkianen (2006) not only notices that the relationship between subjective norms and attitudes towards buying organic food is significant, but also that attitudes towards buying organic food and subjective norms are not independent. This study shows that subjective norms influence attitudes, contrary to the original theory proposed by Ajzen (1977). Therefore, the following hypotheses are proposed.

H10: There is a positive relation between Subjective Norms and trust on organic market agents and institutions.

H11: Subjective norms positively influence attitudes towards organic food.

H12: There is a positive relation between subjective norms and intention to purchase organic food.

2.2.6 Attitudes toward Organic Food

Intentions are indications of how hard people are willing to try or how much effort they are planning to exert in order to perform the behavior (Ajezen, 1991). Intentions are the best individual predictors of planned behavior and are an impartial predictor of an action (Bagozzi et al., 1986). According to the TPB proposed by Ajzen and Fishbein (1977), the intention of performing or not a behavior is determined by personal factors. The TPB theory assumes that each factor has a relative weight to be determined, and that these weights depend on the intention we are studying as well as the person in question (León et. al, 2004).

In relation to personal matters, a key element to highlight is the beliefs individuals have about the potential consequences derived from the realization of a particular behavior. Individuals will develop a favorable attitude when most of the beliefs about own behavior are based on positive consequences, and will be unfavorable when most of these beliefs are substantiated in negative aspects (Ajzen, 1977; Ajzen, 1980). In conclusion, according to the TPB when individuals' attitudes towards the participation of a behavior are positive, they are more committed with that behavior. Therefore, when the consumers' attitude towards organic food is positive, consumers will show greater intentions to purchase organic foods (Chen, 2007; Aertsens, et al. 2011).

H13: Consumer with a positive attitude toward organic food will exhibit a positive intention to purchase organic food.

2.2.7 Price

Regarding the importance of prices, in this market the information is scarce and partial. However, as a general rule, it is admitted that organic food prices are superior to those of their conventional counterparts. Price premia for organic food vary among countries, product types and processing degree (Michelsen et al. 1999): in fruits and vegetables premia may vary between 50% and 100%, sometimes up to 250% (Thompson,

1999, Glaser and Thompson, 1999), while in dairy products range from 15% to 50% (Menghi, 1997, Glaser and Thompson, 2000).

The majority of studies dealing with the demand for organic products have focused on measuring the consumers' willingness to pay (WTP) a premium for them and to relate the WTP with their socioeconomic variables and lifestyles (Byrne et al., 1991; Groff et al., 1991; Collins et al., 1992; Weaver et al., 1992; Blend and Van Ravenswaay, 1998; Sánchez et al., 1998a, 1998b; Gracia et al., 1998; Mann et al. 2012), assuming that prices are the main brake to organic food consumption. Among factors explaining consumers' WTP, Misra et al. (1991) found that those consumers more concerned about the health effects caused by the presence of residues in food had a higher WTP for the certified organic food. Krystallis and Chryssohoidis (2005) concluded that main factors were: food quality, safety, trust in certification and, for some products, the brand name. Familiarity with the concept of organic products has been shown to be also a key element (Underhill and Figueroa, 1996). Sanchez et al. (1998a), Govindasamy and Italia (1999) and Gil et al., (2000) detected a significantly higher willingness to pay for a consumer segment who qualify themselves as regular buyers of these products. Therefore, the following hypothesis is proposed.

H14: as more relevant is the factor price considered by consumers when purchasing more willing are them to purchase organic food if its price decreases.

2.3 Research methodology

2.3.1 The Sample

The data in this study were collected from a survey conducted in spring 2011 to a sample of 338 adult's representative of Barcelona population. Respondents were recruited by a professional market research company and they had to be the primary food purchaser within the household.

2.3.2 Measures

The survey instrument was based on previous literature that has tried to measure the different constructs mentioned in the previous section. Table 2.1 shows the main items used for each construct.

Table 2.1 List of indicators used for each construct

Construct	Indicators
Subjective Norms (**C1**)	**X1:** The people who is important to me believe that I should buy organic food
	X2: My family believe that we should include in our diet organic food
	X3: My friends advise me to buy organic food
Environmental and Health Concern **(C2)**	**X4:** Current food production systems are destroying the environment
	X5: For me is important to produce the food in a friendly environment
	X6: For me is important to be that the food I eat have to be rich in vitamins and proteins
Trust **(C3)**	**X7:** I trust on the veracity of the certification organic food labeling
	X8: I trust in the market agents that sell organic food
Risk **(C4)**	**X9:** Could you tell me which is the perceived health risk for consume regularly food grown with pesticides and other chemicals?
	X10: Could you tell me which is the perceived risk for consume food from animal origin treated with hormones and antibiotic?
Subjective Knowledge **(C5)**	**X11:** How informed do you consider yourself about organic food?
	X12: from my friends. I consider myself an expert in organic food
Price **(C6)**	**X13:** I put attention to the products on sale when I buy food
	X14: At the time to purchase I contrast the possible alternatives
Attitudes toward Organic Food **(C7)**	**X15:** Organic food are as safety as conventional.
	X16: Organic food have the same content of vitamins and minerals than conventional ones
Purchase Intention **(C8)**	**X17**: I have the intention to purchases organic food if the price decreases

- The purchase intention measure has been obtained following Ajzen (2006), Magistris and Gracia (2008); and Lockie et al. (2004).
- Subjective norms statements are based on Ajzen (2002).
- The constructs for environmental and health concerns are based on Botonaki (2006) and Magistris and Gracia (2008).
- The price construct has been adapted from measures contained in Botonaki (2006).
- Attitudes towards organic food are based on items from Magistris and Gracia (2008).
- Items for the construct trust in market agents and institutions have been adapted from Chen and Li (2007), while the measures of risk were adapted from Lockie et al. (2004).
- Subjective knowledge is measured taking into account Alba (1983), Rao and Monroe (1988), Alba and Hutchison (1987) and Dodd et al. (2005).

All items were measured on a 7-level Lickert scale, where "tend to agree" responses are codified by ordinal values between 1 and 3, "undecided or indifference" by 0 and finally, "tend to disagree" by ordinal values between -1 and -3. The survey also contained questions on socio-demographic characteristics of respondents (gender, income, education level, age).

2.3.3 Analytical procedures

Structural equation modeling has been used in this study to test the causal links specified in the theoretical model. Indeed, the structural regression (SR) model has been estimted following a two-step modeling approach (Anderson and Gerbing, 1988), where we first define an acceptable confirmatory factor analysis (CFA) and next an adequate SR model.

Following Jöreskog and Sörbom (1996), we have specified a Structural Equation Model which consists of three main types of relationships. First, a measurement model is identified after performing confirmatory factor analysis. The outcome relates, on one hand, observed indicators with the exogenous latent variables:

$$x = \Lambda_x \xi + \delta$$

where x, is a $q \times 1$ vector of observed exogenous or independent variables, Λ_x is a $q \times n$ matrix of coefficients of the regression of x on ξ, ξ is an $n \times 1$ random vector of latent independent variables and δ is a $q \times 1$ vector of error in x.

On the other hand, observed indicators are related with the endogenous constructs:

$$Y = \Lambda_y \eta + \epsilon$$

where y, is a $p \times 1$ vector of observed endogenous or dependent variables, Λ_y is a $p \times m$ matrix of coefficients of the regression of y on η, η is a $m \times 1$ random vector of latent dependent variables and ϵ is a $p \times 1$ vector of measurement errors in y.

A third equation defines the structural model, which specifies the causal relations that exist among the latent variables, describes its causal effects and assigns the explained and unexplained variances (Jöreskog and Sörbom, 1996).

$$\eta = B\eta + \Gamma\xi + \zeta$$

where B is a $m \times m$ matrix of coefficients of the η variables in the structural relationship, Γ is a $m \times n$ matrix of coefficients of the ξ - variables in the structural relationship, and ζ is a vector of errors.

This study uses ordinal data, arguably a rudimentary measurement of continuous variables where the scale is considered as thresholds of the continuous variables (Jöreskog and Sörbom, 1996). Correlations among ordinal variables are called polychoric correlations, which are theoretical correlations of continuous versions (Jöreskog and Sörbom, 1996). In order to perform the analysis we have used the General Weighted Least-Squares (WLS) method instead of Maximum Likelihood (ML) since both the data present a non-normal distribution and because ML do not allow us to employ the weight matrix for the analysis, which is the inverse of the estimated asymptotic covariance matrix E of the polychoric correlations (Kline, 2005).

$$F(\theta) = (s - \sigma)' W (s - \sigma)$$

where s' is a vector of the elements in the lower covariance matrix s of order $k \times k$, σ' is the vector of corresponding elements of $\Sigma(\theta)$, W^{-1} is the positive definite matrix of order $u \times u$ where $u = k(k+1)/2$. The WLS function is the weighted computation of the squares residuals.

Finally, we will assess the goodness-of-fit of the model by analyzing factor loadings which relate each indicator with the constructs. Reliability will be measured by means of composite reliability and Cronbach's α. Moreover, the extracted validity for each construct will be also measured (Hair et al., 1999).

Regarding the structural model, we begin with an assessment of the significance of the estimated parameters in the structural equations (Hair et al., 1999). Then, we proceed with estimating the reliability coefficients of each equation and the associated correlation matrix among constructs included in our model (Barrio and Luque, 2000). Finally, diagnostic checking for both the CFA and the SR model has been carried out using the Chi-square (χ^2); the Root Mean Square Error of Approximation (RMSEA); the Goodness-of-Fit Index (GFI); the Adjusted Goodness of Fit Index (AGFI); the Comparative-Fit-Index (CFI); the Normed-Fit-Index (NFI) and the Non-Normed-Fit-Index (NNFI).

2.4 Results

2.4.1 Sample characteristics and Descriptive analysis

The main socio-demographic characteristics of the sample are shown in Table 2.2. The sample is made up of 225 (67%) women and 113 (33%) men. Almost 70% of the respondents are between 35 and 65 years old. The majority of the sample (more than 80%) has finished secondary school, has a medium household income level (from 1000 to 5000 €/month family) (71%), has children at home 70% and almost 70% buy organic food occasionally.

Table 2.2 Demographic distribution of the sample

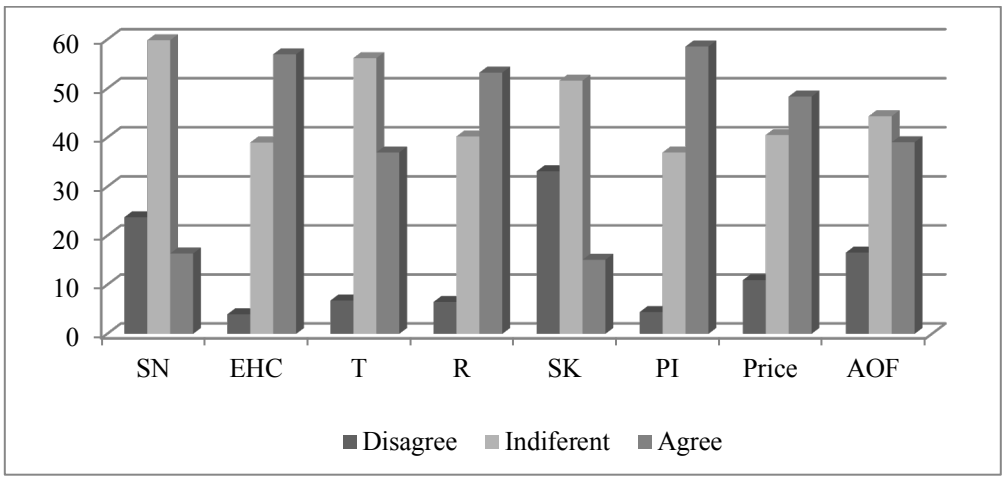
Demographic	N = 338	%	Official Population distribution*
Gender			
Female	225	67	51
Male	113	33	49
Age in years			
18-34	125	37	30
35-49	102	30	29
50-64	93	28	21
65 or older	18	5	20
Education			
Primary school unfinished	1	0	12
Primary school finished	25	7	26
Secondary school unfinished	29	9	25
Secondary school finished	116	34	23
University degree	148	44	14
Post graduated degree	19	6	
Income in Euros			
1000 or less	53	16	No available
1001-2000	110	33	data
2001-3000	81	24	
3001-5000	46	14	
5001 or more	34	12	
No answer	14	4	
Childs at home			
Yes	236	70	
No	102	30	
Consume organic food			
Usually	36	11	
Sometimes	189	56	
Never	112	33	

**IDESCAT 2009*

Figure 2.2 shows some descriptive statistics about the constructs. Respondents valued each construct by means of a 7-item Likert scale. However, to make easier the presentation of results we have grouped them in three categories labeling them as "agree", if the response value was between 1 and 3 and disagree, if responses range between -1 and -3. As can be observed, Spanish consumers reveal a considerable confidence in the organic market agents

and institutions. Moreover, more than 50% of the respondents are concerned about the environment and their health. Nearly 40% of the participants have positive attitudes towards organic food and almost 60% are not influenced by their families, friends or other important references when deciding on organic food consumption. More than 50% of the sample perceives the risks associated to consume food produced and processed using synthetic chemicals, additives or fertilizers. Finally, for the majority of the sample price is a key factor when adopting purchasing decisions and almost 60% of the respondents declare that they will purchase organic food if the price of organic food decreases.

Fig. 2.2 Descriptive Statistics on constructs (%)



SN: Subjective Norms; EHC: Environmental and Health Concern; T: Trust in market agents and institutions; R: Perceived Risk; SK: Subjective Knowledge; PI: Purchase Intentions; AOF: Attitudes towards organic food.

2.4.2 Measurement model (confirmatory analysis)

As mentioned in Section 2.3, the first step of the study has been to carry out a confirmatory factor analysis for the whole set of constructs: subjective norm, environmental and health concern trust in market agents and institutions, perceived risk, subjective knowledge, attitudes toward organic food, price and purchase intention assuming all errors to be correlated. The confirmatory factor analysis with all indicators results suitable for the Model. The correlation matrix among all variables is presented in Table 2.3. Moreover the correlation matrix of the independent latent construct is presented in Table 2.4. All constructs were measured by three or two construct indicators as proposed by Kline (2005) among others.

Table 2.3 Correlation matrix among indicators

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16	X17
X1	1																
X2	0.697	1															
X3	0.541	0.532	1														
X4	0.185	0.206	0.202	1													
X5	0.266	0.296	0.318	0.300	1												
X6	0.196	0.186	0.138	0.238	0.367	1											
X7	0.233	0.182	0.216	0.146	0.152	0.034	1										
X8	0.172	0.195	0.220	0.158	0.164	0.002	0.577	1									
X9	0.180	0.235	0.212	0.340	0.309	0.152	0.078	0.101	1								
X10	0.217	0.305	0.260	0.330	0.306	0.240	0.073	0.135	0.650	1							
X11	0.319	0.347	0.368	0.083	0.147	-0.117	0.196	0.140	0.088	0.037	1						
X12	0.283	0.280	0.401	0.163	0.147	0.062	0.323	0.219	0.219	0.163	0.394	1					
X13	-0.142	-0.123	-0.075	0.010	-0.005	0.093	-0.092	-0.015	0.021	0.031	-0.133	-0.014	1				
X14	-0.015	0.037	-0.038	0.018	0.084	0.149	-0.033	0.073	0.133	0.121	-0.055	-0.097	0.086	1			
X15	0.055	-0.009	0.005	0.001	0.039	0.106	0.116	0.072	-0.014	0.033	0.033	0.005	0.069	0.248	1		
X16	-0.072	-0.141	-0.104	-0.128	-0.092	0.012	0.065	0.037	-0.068	-0.117	0.001	0.061	0.118	0.162	0.265	1	
X17	0.267	0.310	0.309	0.208	0.253	0.092	0.211	0.176	0.263	0.217	0.166	0.193	0.136	0.156	0.091	-0.102	1

Table 2.4 Correlation Matrix of the Independent latent constructs

	SN	EHC	PRICE	K
SN	1			
EHC	0.49	1		
	-0.05			
	10.54			
PRICE	-0.25	0.21	1	
	-0.09	-0.1		
	-2.72	2.09		
K	0.76	0.13	-0.34	1
	-0.04	-0.05	-0.1	
	21.49	2.49	-3.58	

The main parameters to test for the robustness of the constructs, following Hair et al. (1999) and Kline (2005) appear to show acceptable results for the Model as shown in Table 2.5. The parameters that are important for examining the internal consistency of the model are composite reliability (which must be >0.7), internal consistency reliability, measured by

Cronbach's α (which must be >0.7) and extracted validity (which must be >0.5) (Bagozzi and Yi, 1988; Hair et al., 1999). For every construct, all composite reliabilities are greater than 0.7 and all Cronbach's α are over 0.7 but for C2, C5 and C7 which is above 0.5, thus we can say that the reliability is acceptable. Regarding the variance extracted, it is higher than 0.50 (Table 2.5).

Table 2.5 Reliability of standardized confirmatory factor analysis (CFA).

Construct	Indicators	Standardized Loadings (t-Values)	Cronbach's α	Composite Reability	Variance Extracted	Measurement Model
C1	X1	0.89 (46.53)	0.81	0.91	0.81	χ^2 = 207.65
	X2	0.9 (50.81)				
	X3	0.86 (36.53)				df = 92
C2	X4	0.66 (14.09)	0.60	0.81	0.68	
	X5	0.91 (24.94)				
	X6	0.71 (19.21)				χ^2 / df = 2.25
C3	X7	0.9 (23.66)	0.73	0.83	0.83	
	X8	0.79 (21.27)				p = 0.00
C4	X9	0.86 (31.50)	0.78	0.87	0.85	
	X10	0.89 (36.01)				RMSEA = 0.061
C5	X11	0.69 (37.00)	0.57	0.77	0.79	
	X12	0.88 (5.11)				CAIC = 1043.93
C6	X13	1(5.95)	0.70	0.72	0.76	
	X14	0.43 (6.12)				CFI = 0.97
C7	X15	0.69 (19.99)	0.52	0.77	0.70	
	X16	0.88 (21.42)				NNFI = 0.95

Note about parameters for a better fit: pvalue>0.05; NC<3; RMSE<0.08; GFI, AGFI and PGFI more than 0.9; NFI, NNFI and CFI close to 1.(Lomax and Schumacker,2004; Kline, 2005; Costa-Font& Gil,2008)

The confirmatory model meets the widely accepted goodness of fit standards indicating that satisfactorily fits the data (see Table 2.5). The Chi-square statistic is significant, χ^2 /*df* = 2.25 which is smaller than 3, showing a reasonable goodness-of-fit (Carmines and Maclver, 1981). The Root Mean Square Error of Approximation (RMSEA) is 0.061 which is in the 0.5-0.8 limit interval suggested by Hair el al., (1999) and Kline (2005). The Goodness of Fit (GFI) is 0.98, the Normed-Fit Index (NFI) 0.95 and the Non-Normed Fit Index (NNFI) 0.95, all were greater than 0.90 as recommended by Marcoulides and Schumacker (1996) and Chen and Li (2007).

2.4.3 Structural model

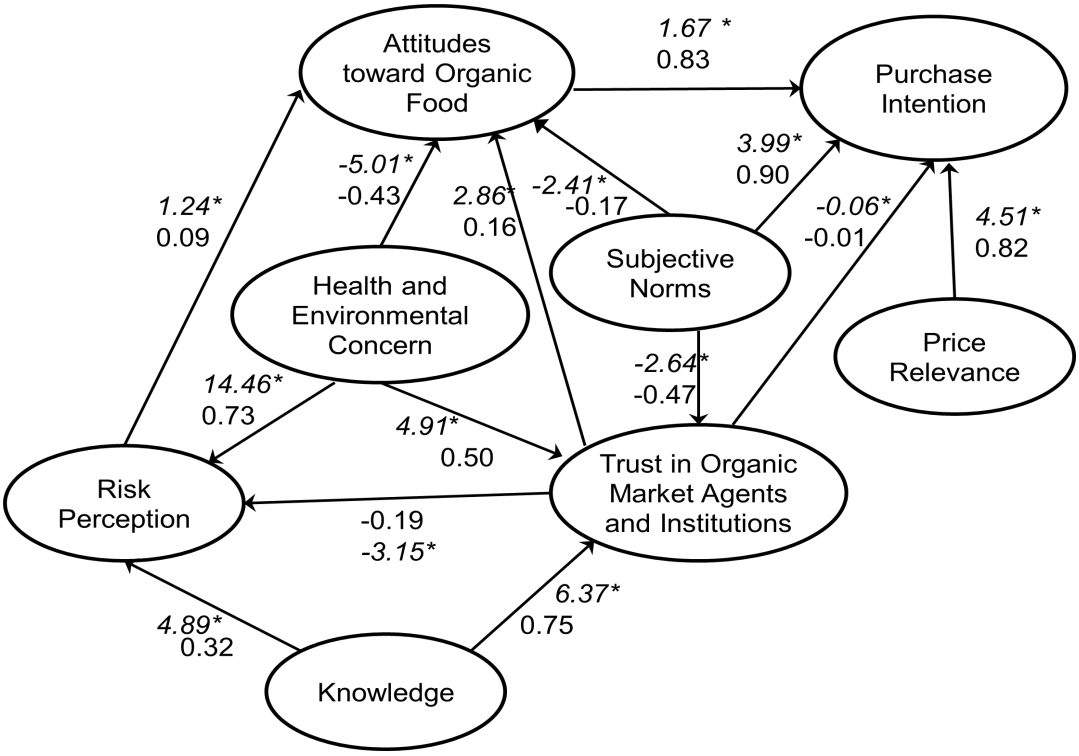
When testing the conceptual model showed in Figure 2.1 using a Structural Equation Model we have found a satisfactory goodness-of-fit (see Table 2.6). Figure 2.3 shows the path diagrams obtained. From the hypothesized relationships in Section 2.2, 9 of them are supported by data. Hypothesis 1 and 2 are supported with a significant path significant at the 5% level of significance. Therefore, it can be concluded that there is a direct and positive relation between knowledge and both trust in organic agents and the perception of risk, being the first relation more important.

Table 2.6 Goodness of fit for the structural equation model

χ^2	250.07	
df	99	
χ^2 / df	2.53	< 3 (Carmines and McIver, 1981)
RMSEA	0.067	<0.5-0.8 (Browne and Cudeck, 1992; Kline 2005)
GFI	0.96	>0.90 (Bollen, 1998; Marcouliders and Schumacker, 1996)
AGFI	0.96	>0.90 (Bollen, 1998; Marcouliders and Schumacker, 1996)
CFI	0.96	>0.90 (Bollen, 1998; Marcouliders and Schumacker, 1996)
NFI	0.93	>0.90 (Bollen, 1998; Marcouliders and Schumacker, 1996)
NNFI	0.94	>0.90 (Bollen, 1998; Marcouliders and Schumacker, 1996)

Regarding to Hypothesis 4, it is clear that the trust in market agents and institutions has a negative and significant impact on risk perceptions, with a path of -0.19. Our model also suggests that there is a positive relationship between trust in organic agents and institutions and attitudes towards organic food (Hypothesis 5) (the estimated path coefficient is 0.16). Conversely, Hypotheses 3 and 6, which related trust and purchase intention (Hypothesis 3) and predicted a positive relationship between perceive risk and attitudes toward organic food (Hypothesis 6), respectively, have not been supported (estimated paths of 0.05 and 0.09, respectively).

Fig. 2.3 Path diagram of the estimated model for organic food



* *t-values*

Results also support Hypothesis 7, indicating that the more concerned are individuals about the impact of food production on the environment and human health, the less positive id their attitudes towards organic food. However, there is a positive and significant relation is between environmental and health concerns and both risk perception and trust in organic market agents and institutions, with estimated paths of 0.73 and 0.50, respectively (Hypotheses 8 and 9), which indirectly affect attitudes positively, as we have mentioned before. Subjective norms have not any influence on a trust and attitudes (Hypotheses 10 and 11) but do have a positive influence on organic purchase intention (Hypothesis 12), with a path of 0.9. Finally, results from the estimated model do not support the existence of a positive relation between attitudes and the intention to buy organic food (Hypothesis 13). On the contrary, prices are a significant factor explaining purchase intentions (Hypothesis 14); more precisely, consumers who really care about the price of the products might buy organic food if they were cheaper (estimated path of 0.82).

2.5 Discussion and conclusions

In this paper, we have tried to explain the complex consumers' decision-making process when purchasing organic food. This process is the result of a specific cumulative interaction of subjective norms, environmental and health concerns, subjective knowledge, trust in market agents and perceived risk. Given that some of the underlying choice dimensions are simultaneously determined and exhibit interactions among constructs, traditional decision making models that assume parameter exogeneity are not meaningful. To overcome this methodological problem we have taken advantage of the Structural Equation Model approach, which allows for endogeneity.

The structural equation model tested 14 hypotheses, 9 of them have been supported (Table 2.7). Results highlight that the cognitive decision making process for organic purchase decision is fragmented into two stages. First, there seems social pressure and prices are the two main determinate of consumers' organic purchasing intention, in line with the resuts found by Chen (2007).

Table 2.7 Summary of results

	Hypothesis	
H1	Subjective Knowledge →Trust in organic markets agents and institution	Supported
H2	Subjective Knowledge →Perceived Risk	Supported
H3	Trust in organic market agents and institutions →Purchase Intention	Not Supported
H4	Trust in organic market agents and institutions →Perceived risk	Supported
H5	Trust in organic market agents and institutions →Attitudes toward organic food	Supported
H6	Risk →Attitudes toward organic food	Not Supported
H7	Environmental and Health concern →Attitude toward organic food	Supported
H8	Subjective Norms →Trust in organic markets agents and institution	Supported
H9	Environmental and Health concern →Trust in organic markets agents and institutions	Supported
H10	Environmental and Health concern →Perceived risk	Not Supported
H11	Subjective Norms →Attitude toward organic food	Not Supported
H12	Subjective Norms →Purchase Intention	Supported
H13	Attitude toward organic food →Purchase Intention	Not Supported
H14	Price →Purchase Intention	Supported

However, and contrary to previous studies such as Tarkiainen and Sunqvist (2005), Tarkianen (2006) and Lobb et al. (2007), results in this study suggest that the relation between attitudes towards organic food and both subjective norms and purchase intention are not significant. This is an important point to highlight because it would mean that consumers decide to purchase or not organic food in response to what others think they have to do independently to their own valuation of the product.

In addition, attitudes towards organic food is build from health and environmental concerns, in line with Michalidou and Hassan (2009), trust in organic market agents and institutions and risk perception associated to conventional agriculture, as also suggested by Chen (2007) and Costa-Font and Gil (2009). In fact, results show that individuals who are more concerned about the consequences of conventional agriculture on human health and the environment do reveal a different attitude between organic and conventional food production. Moreover, we have found a positive relation between health and environmental concerns and the perceived risk of conventional production systems, on one hand, and with trust in organic market agents and institutions, on the other. Altogether, these three relations place health and environmental concerns as a key element on the cognitive process of organic food evaluation.

Furthermore, attitudes towards organic food are indirectly influenced by individuals' subjective knowledge. The more knowledgeable about organic production consumers perceive themselves; they have more trust on organic institutions and perceive conventional food production more risky.

In summary, results from this study has provided evidence that key factors explaining the consumers' intention to purchase organic food in Spain are: 1) the knowledge about organic food production on forming risk perception associated to food production as well as on building trust in organic markets and institutions (suggesting that more effective promotion and information campaigns by publicly recognized institutions will become a key factor for future success); 2) Subjective norms, 3) affordable prices; and finally 4) health and environmental concerns.

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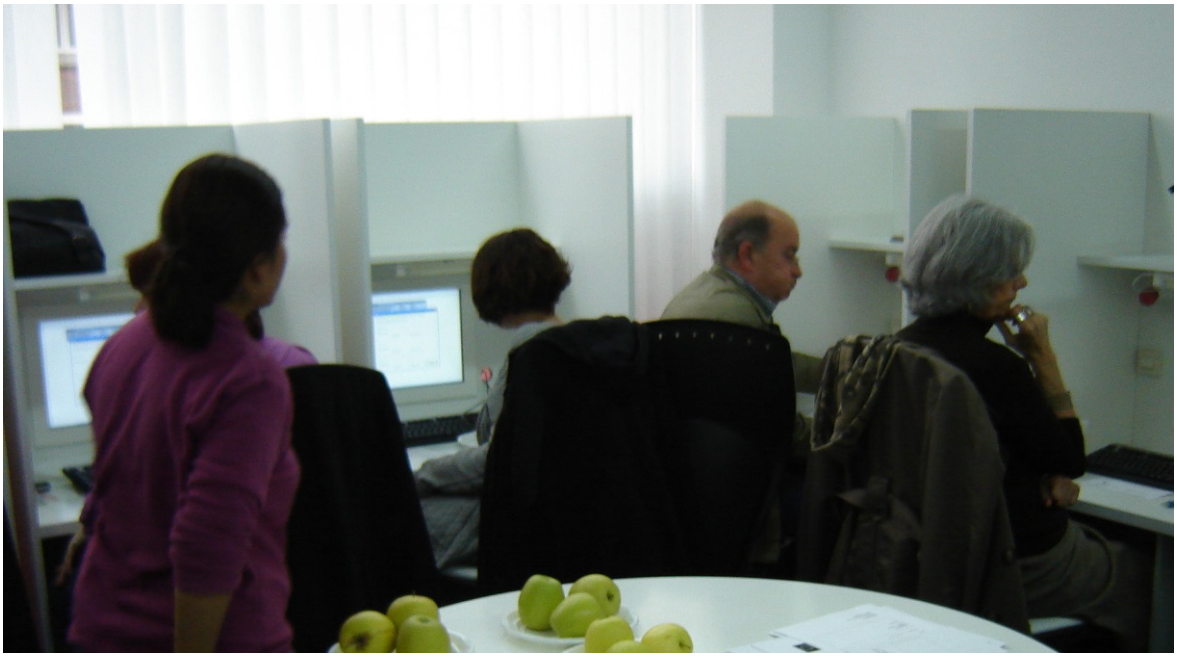
CHAPTER 3

A calibrated auction-conjoint experiment to elicit consumer preferences for sustainable farming.



ABSTRACT

This paper analyzes the "Calibrated Auction-Conjoint Valuation method" (CACM), by comparing Non-adjusted values from a self-explicated conjoint method to the final calibrated values entered into a non-hypothetical auction in a context well suited to the CACM: preferences for sustainable farming. It explores the importance of pricing information in dealing with sustainable food preferences. We found consumers significantly reduced their WTP when moving from the initial stage of the CACM to the final stage, primarily by placing less importance on product prices, implying that WTP values from a self-explicated conjoint method used alone would likely lead to overstated estimates of WTP.

3.1 Introduction

It is known that agriculture has an important effect on the environment due to its significant use of land and natural resources as well as its production of waste and pollution. Indeed, agriculture is faced with the challenge of producing food for a rapidly growing world population while maintaining the world's fragile resources. To do that, conventional agriculture has used chemicals and fertilizers that can have side effect for the environment. Therefore, sustainable development cannot be achieved without major contributions from agriculture. Agriculture is considered sustainable when the sources of food production cause less degradation of the ecological system compared to conventional production systems (Quenum, 2010). Consumer preferences for sustainable goods are based on how they are produced and how consumers value pollution emissions, use of chemical fertilizers, etc. (Hamilton and Zilberman, 2006). The present study utilized the CACM to determine consumer preferences for sustainable farming (e.g., organic and integrated).

During the past decade, results from hypothetical valuation methods have been heavily criticized because of the observation that consumers tend to overestimate their real WTP as compared to what happens in experiments with real economic incentives (e.g., List and Gallet, 2001). The exchange of money in economic experiments changes valuations, and recent research suggests that it produces results that are more constant with consumer choices when one shops outside the laboratory (Chang, Lusk, and Norwood, 2009). These observations have motivated the search for improved non-hypothetical valuation methods.

One of the most popular valuation methods is conjoint analysis. Conjoint analysis was introduced in the marketing literature about 40 years ago by Green and Rao (1971) and typically involves people rating, ranking or choosing among various options that differ by several attributes so as to elicit consumer preferences, estimated demand, and/or forecast market share. The advantage of conjoint methods is that they allow the researcher to study demand to analyze numerous product attributes. The disadvantage is that the methods are typically hypothetical (see Lusk, Fields and Prevatt, 2008, for an exception). Conjoint methods typically do not offer immediate financial consequences for the participants. Moreover, the methods are often limited in the number of attributes that can be feasibly studied. This study reports on an attempt to overcome both of these weaknesses of

traditional conjoint methods in application involving a complex, multi-attribute good: agro ecosystem preservation.

Incentive-compatible elicitation mechanisms can be categorized into two general categories: experimental auctions and non-hypothetical discrete choice experiments (Corrigan et al., 2009; Lusk and Shogren, 2007; Lusk and Schroeder, 2004). One of the main advantages of experimental auctions is that they place subjects in an active market environment where they can learn and adjust to market conditions. In addition, bids provide researchers an explicit estimate for each participant's WTP without the need to estimate an econometric model. Non-hypothetical choice experiments incorporate incentives into the traditional conjoint by randomly selecting one of the several repeated choices between competing product profiles as the biding. The participant purchases the product indicated as most preferred in the randomly selected choice set (Alfnes et al. (2006), Carlsson and Martinsson (2001), Ding, et al. (2005), Ding (2007) Lusk and Schoroeder (2004), Lusk et al. (2008)).

The upside of non-hypothetical choice experiments is that they are easy for people to answer, being more similar to the choices people make in the marketplace. The downside is that choice experiments can require sophisticated experimental designs and econometric estimates to drive WTP estimates. Recently, Norwood and Lusk (2011) suggested an approach combining the strengths of conjoint and auction elicitation methods in a procedure that promotes systematic and rational behavior; they referred to the approach as the Calibrated Auction Conjoint valuation Method (CACM).

The CACM works as follows. First, participants answer a series of simple rating questions where they indicate the relative desirability of different product attributes and the associated levels of each attribute. This step uses the so-called self-explicated conjoint approach and can accommodate a large number of attributes while designating levels, as the analyst is not required to use a specific experimental design. Second, a computer takes the ratings to construct a utility function for specific products as defined by the underlying attributes, and calculates each respondent's implied WTP for the products. Third, subjects are shown the calculated WTP values and are asked to return to step 1 to readjust (or calibrate) their ratings (and indirectly the utility function) if they wish to change their WTP.

Finally, once subjects are settled on their WTP values, they are entered as bids into an incentive-compatible and non-hypothetical experimental auction.

With the CACM, people calibrate their attribute-based utility functions to produce the auction bids they desire. The CACM has several advantages over existing valuation approaches. First, it generates consistent and systematic responses by linking auction bids with conjoint ratings and an underlying utility function. This consistency or rationality works as follows: it imposes a mechanical or algebraic relationship between valuations and utility and next, respondents have the chance to directly see the consequence of their conjoint-rating decisions ant the trade-offs implied in their auction bids. Second, the CACM is an iterative valuation process that promotes learning and provides feedback, helping subjects to form rational preferences. Third, it allows for a distribution-free characterization of heterogeneity regarding preferences. Finally, the CACM allows for the evaluation of a large number of attributes and attribute-levels while enabling the estimation of people's values for a very large number of products (see Norwood and Lusk, 2011).

Our main contribution is that in addition to linking the auction bids with the conjoint rating to investigate consumer preferences for sustainable farming, we compare the Non-adjusted values to the final calibrated values entered into a non-hypothetical auction to explore the internal consistency of people's behaviors and the relevance of the price attribute versus agro-ecosystems preservation in the market for apples. Furthermore, we complete the experiment with a survey to determine factors that explain changes in consumer WTP when using Non-adjusted versus non-hypothetical adjusted valuation methods. The key result of this study is the adaptation of the CACM which allows to obtain a middle WTP (a hypothetical bid). We consider the middle WTP of CACM methodology and compare it with the final WTP, in order to appreciate the real importance of the parameter price, in comparison with the other attributes associated to the product, for sustainable food purchase decisions.

The structure of the chapter is as follows. The next section explores the background on organic and integrated farming systems. The third section is devoted to the description of the methods, data, and analytical procedures, while section four reports the results. Finally, section five contains the concluding remarks.

3.2 Background on Organic and Integrated Farming Systems

There are two main sustainable farming production systems in Spain: integrated and organic farming. These production systems meet the potentially conflicting challenges at the farm level, in a manner that balances food production, profitability, safety, animal welfare, social responsibility and environmental care.

On the one hand, Organic farming (OF) is a production system that combines the best environmental practices and the application of high-animal welfare standards. It also restricts the use of chemical fertilizers and pesticides, while livestock are farmed with restrictions in terms of drug and hormone use (Magistris and Gracia 2008; Michaledou and Hassan, 2009). On the other hand, integrated farming is defined as an agricultural system of food production and other high quality products that use resources and natural regulation mechanisms to avoid adverse contributions to the environment while also ensuring long-term sustainable agriculture (International Organization for Biological Control, IOBC). One of the differences between organic and integrated production is that crop protection in the latter combines the use of biological controls for pest control with traditional techniques based on agrochemicals, while organic farming prohibits the use of synthetic agrochemicals (Miret, 2004). See Table 3.1 as a summary of the main differences between integrated, organic and conventional food production. It is important to highlight that integrated farming is not considered by any European regulation; therefore each member state has its own regulation, resulting in consequent differences among countries. Nevertheless, there is an initiative named "European Initiative for Sustainable Development in Agriculture (EISA)" that attempts to eliminate the gaps between the different European regulations regarding integrated production by establishing a definition for integrated farming (IF) while setting certain guidelines at the European level. In Spain, IF is regulated by REAL DECRETO 1201/2002, which establishes the general characteristics and requirements for integrated agriculture. According to a survey done in 2010 by the Spanish Ministry of Agriculture, the nation dedicates 601,394 hectares to integrated production and 988,323.67 hectares to organic production.

Table 3.1 Description of the systems

Systems	Descriptions
Conventional	In these production systems were promoted intensive irrigation systems in wide open plains, monoculture plantations and expensive external inputs. Although has a random control the conventional systems allow the use of fertilizers, pesticides and herbicides. No need an associated certification for the plant material and do not have any kind of certification. It allows the use of any postharvest treatment according to law. These systems not explicitly consider the environmental impact simply follow the existing general regulations.
Integrated	In these productions exists a mandatory control. It allows the use of fertilizers but differs from the conventional systems that the integrated systems enhances the applications of natural fertilizers and reduces the use of mineral and chemical synthesis fertilizers. Allows the use of pesticides (synthetic chemicals) as long as it is a rational application and the use of certain herbicides in some conditions. For both have to precede the biological methods than the chemical ones. A certification is needed for the plant material. The uses of postharvest treatments are authorized if they are technically justified. Priority is given to physical methods. Integrated systems have a certification and the produce respects the environment and minimizing environment impact.
Organic	The organic production has a mandatory control. It allows the uses of natural extractive mineral and organic fertilizers. The uses of mineral and chemical fertilizers are prohibited. The pesticides and herbicides (synthetic chemical products) are prohibited. For the plant material is necessary to use organic plant material certified or from authorized producers. The postharvest treatment is prohibited, unless they are natural like the use of hot water. All the products have a certification and the produce supports the biodiversity, respecting the environment and minimizing environmental impact.

For the purpose of this research, we compare conventional, integrated and organic apple production systems to determine consumers' evaluations of agro-ecosystems preservation or sustainable agriculture.

3.3 Methods, data and analytical procedure

3.3.1 The data

The data used in this study were collected by means of an experiment with real economic incentives. To perform the experiment, a specific software program was developed using Visual Basic. A sample of consumers from Barcelona (Spain) was recruited by a marketing research company for the purpose of this study. Participants were recruited by phone to participate in an "apple preference study" and were promised 20€ for their participation. The selection of apples as the product of study responds to the aim of valuing the behavior

towards a fresh product. In addition, apples are commonly consumed by the general public and of easy conservation. The last reason is that there are few products in Spain produced under the three systems of interest of this research. Eight sessions of 10 participants each were conducted in March 2010. The main socio-demographic characteristics of the sample are shown in Table 3.2. The sample was made up of 40% men and 60% women. Almost 70% of the respondents were between 35 and 65 years old. As expected, the majority of the sample (more than 80%) had finished secondary school and had a medium household income level (from 1000 to 5000 €/month family).

Table 3.2 Demographic distribution of the sample

Demographic	N = 80	%	Official Population distribution*
Gender			
Female	48	60	51
Male	32	40	49
Age in years			
18-34	23	29	30
35-49	32	40	29
50-64	23	29	21
65 or older	2	2	20
Education			
Primary school unfinished	1	1	12
Primary school finished	4	5	26
Secondary school unfinished	6	8	25
Secondary school finished	40	50	23
University degree	25	31	14
Post graduated degree	4	5	
Income in Euros			
1000 or less	5	6	No available data
1001-2000	28	35	
2001-3000	26	32	
3001-5000	15	19	
5001 or more	6	8	

**IDESCAT 2009*

3.3.2. Experiment design

The experiment was conducted in three stages[1]: 1) welcome and introduction to the experiment, 2) the survey, and 3) the CACM. During the introductory stage, each respondent was seated in a cubicle with a computer. Then, a brief explanation of the experiment objectives and confidentiality of the data was provided.

During the second stage, the respondents were requested to answer a computer-based survey containing questions regarding organic purchase behavior, risk perceptions associated with agricultural products, environmental attitudes, and the influence of social norms on respondent behavior, trust in organic market agents, and the importance of price in food purchases. We asked participants not to skip ahead in the survey, so that everyone answered the same questions at the same time. This allows us to answer questions as they arose during the experiment and help respondents to sort out any problem with the computer.

Finally, the last stage of the experiment consisted of the CACM. Following Norwood and Lusk (2011), the respondents were first asked to rank their preference for different characteristics associated with three different production systems (organic, integrated and conventional production). To select and define the attributes associated with the different production systems, a focus group[2] with experts was previously conducted by the research team. The focus group was integrated by three technical experts, two professors of agriculture and two farmers of organic food.

The selected attributes were price, environmental impact, the use of fertilizers, pesticides and herbicides, plant material, post-harvest treatments, and certification (see Table 3.3 for a description of the attributes and levels as they were delivered to the respondents). Before starting this stage of the experiment, a cheap talk script was introduced. During the 1990s, there was an intensive debate about the possibility of using CV as a survey method to value

[1] First of all, a pilot experiment was conducted. Its aim was to test both the "software" developed for the CACM experiment and the methodology that would be used for the auction. A total of 10 participants (students and colleagues) were employed.

[2] " carefully planned series of discussions designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment" (Krueger and Casey, 2000, p. 5)

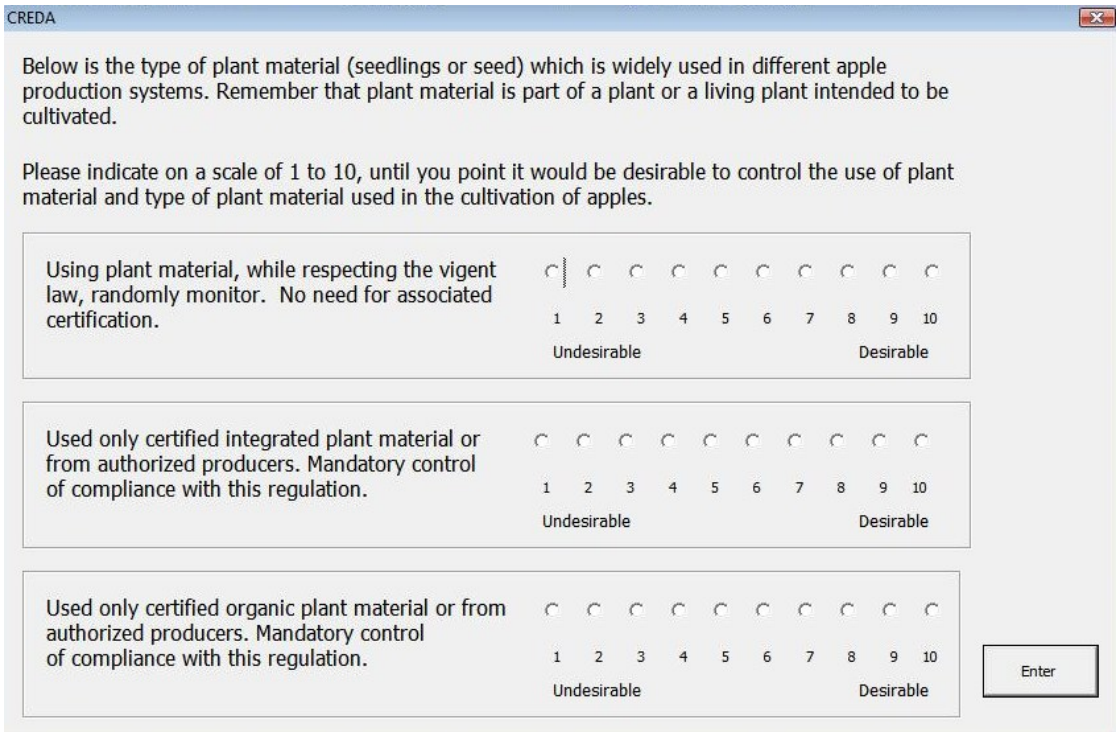
preferences. Much of this debate is concerned to the validation of the results from hypothetical experiments. Cheap talk scripts seemed to be one of the most successful attempts. Initially suggested by Cummings and Taylor (1999), the cheap talk is an attempt to bring down the hypothetical bias by thoroughly describing and discussing the propensity of respondents to exaggerate stated willingness to pay (WTP). Finally, we asked consumers to be careful and think about their answers.

Table 3.3 Attributes and attributes levels

Attributes	Level 1 *Conventional System*	Level 2 *Integrated System*	Level 3 *Organic System*
A1 ***Fertilizers***	Random control It allows the use of three types of fertilizers (mineral chemical synthesis, organic and natural minerals)	Mandatory control It allows the use of three types of fertilizers. The obligatory control enhances the application of natural fertilizers and reduces the use of mineral and chemical synthesis fertilizers.	Mandatory control. The use of mineral and chemical synthesis fertilizers is prohibited. It allows the use of natural extractive mineral fertilizers and organic fertilizers
A2 ***Price***	P1	P2(20 – 25% more expensive than P2)	P3 (20 – 25% more expensive than P2)
A3 ***Pesticides***	Random control Allows the use of synthetic chemicals.	Mandatory control Allows the use of synthetic chemicals, as long as it is a rational application. Have to precede the biological, biotechnological, cultural, physical and genetic methods to the chemicals methods.	Mandatory control The use of synthetic chemicals products is prohibited.
A4 ***Herbicides***	Random control It allows the use of herbicides	Mandatory control Only allows the use of certain herbicides in some conditions. Have to precede the biological, biotechnological, cultural, physical and genetic methods to chemical methods.	Mandatory control The use of herbicides is prohibited.
A5 ***Plant material***	Random control Using plant material, while respecting the law. No need for associated certification.	Mandatory control Used only certified integrated plant material or from authorized producers.	Mandatory control Used only certified organic plant material or from authorized producers.
A6 ***Postharvest treatment***	Random control It allows the use of any post harvest treatment according to law.	Mandatory control Only allows the use of post harvest treatments authorized by law if they are technically justified. Priority is given to physical methods or natural products to synthetic chemical products.	Mandatory control. Prohibited unless they are natural products (eg hot water).
A7 ***Certification***	There are not certification	Integrated production certification.	Organic certification production
A8 ***Environmental impact***	Not explicitly consider the environmental impact. Simply follow the existing general regulation.	Produce, respecting the environment and minimizing environmental impact.	Produce supporting biodiversity, respecting the environment and minimizing environmental impact.

Collection of data for the CACM proceeded in three steps[3] : *Step 1:* Participants were shown numerous tables on the computer screen that corresponded to each of the attributes studied. In each table, the respondents were asked to rate the desirability of each attribute-level on a 1 to 10 scale, where 1 was very undesirable and 10 was very desirable. In each case, and previous to the participant's evaluation, a full description of each attribute level was presented (See Figure 3.1 as an example).

Figure 3.1 Step 1: Rate the desirability of attributes levels

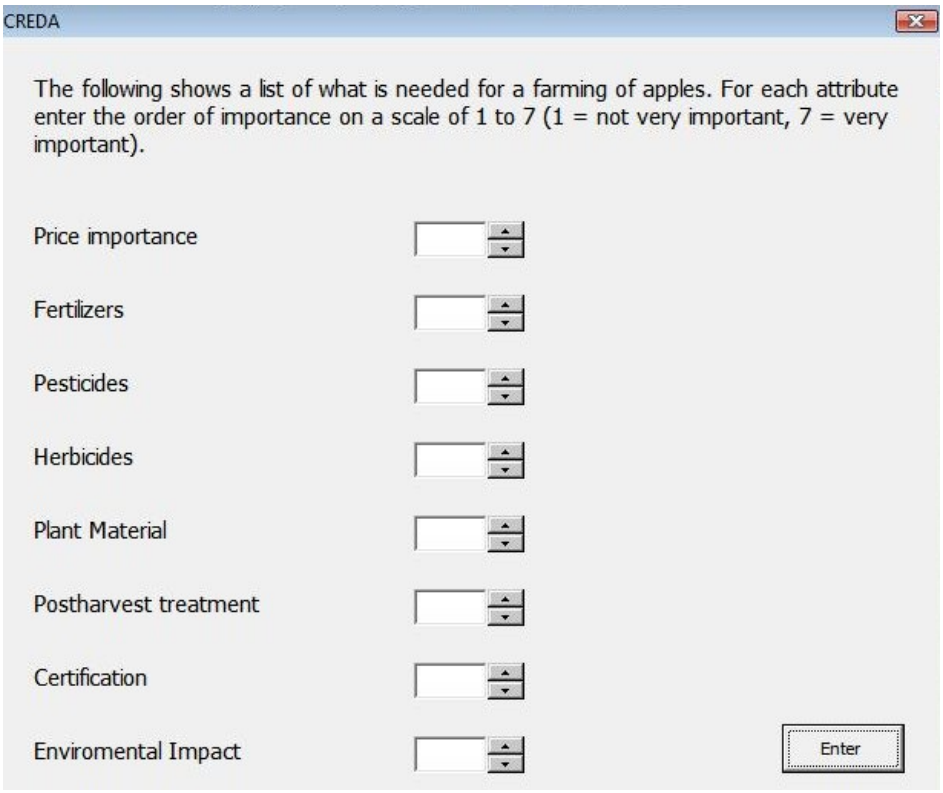


Step 2: Participants were asked to indicate the relative importance of each attribute when purchasing apples on a 1 to 7 scale, where 1 was very unimportant and 7 was very important (see Figure 3.2). Respondents were encouraged to think about the relative importance.

The first two steps mirror the approach used in self-explicated conjoint studies (see Srinivasan and Park, 1997).

[3] The whole experiment was not explained to respondents at the beginning of the experiment. We did explain the experiment step by step.

Figure 3.2 Step 2: Indicate the relative importance of each attribute



Step 3: The last step of the CACM consisted of an auction[4]. The bids were calculated using the data collected in steps 1 and 2, and the subjects were told that their bids should be adjusted to reflect the highest amount of money that they were willing to pay for one kilo each of the three different kinds of apples. Consumers were told that the winner would have to pay for the kilo of apples that would be selected, following the procedure discussed below.

Participants were asked to bid for a kilo of conventional apples. Following Norwood and Lusk (2011), a bid was forecasted for two other products (organic and integrated) using each person's previous responses to the ranking questions in steps 1 and 2. To estimate each individual's WTP for each apple product, we followed Norwood and Lusk (2011). First, individual i's attribute-based utility for a kilogram of each apple type j (Z_{ij}) was

[4] People were trained on the use of the bidding procedures. Consumers participated in an auction for a mineral water 33cl bottle to become familiarized with the procedures. The mineral water auction was designed to mimic the apple auctions to facilitate the learning process.

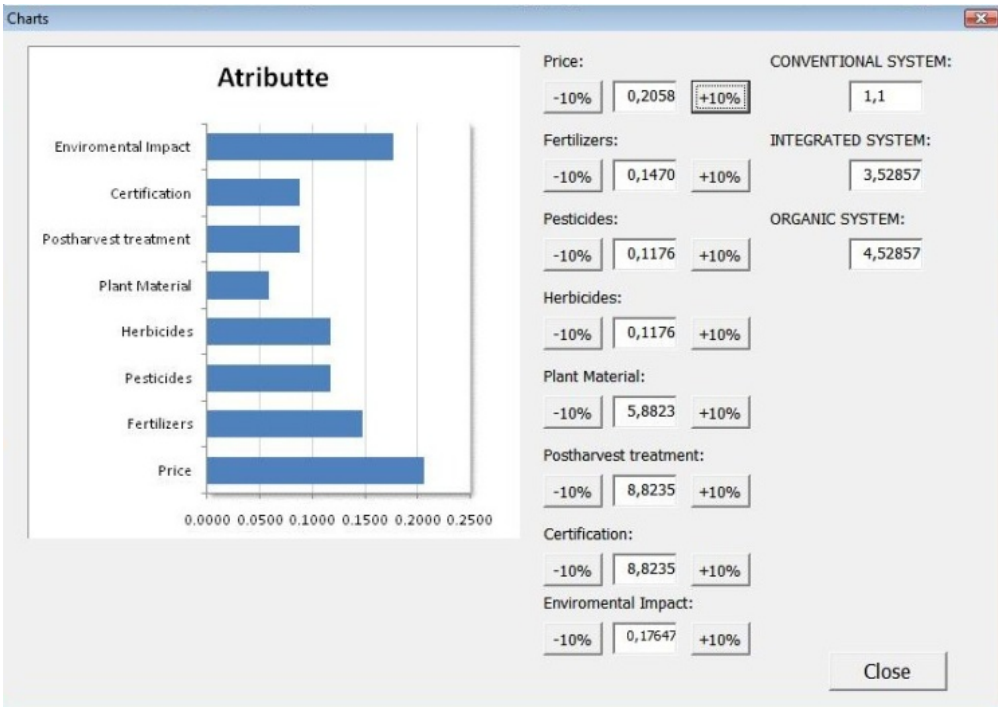
calculated by multiplying the relative importance of each attribute, using data obtained from stages 1 and 2 of the CACM as follows:

$$(1)\ Z_{ij} = W_{kl}\sum_{k=1}^{K}\sum_{l=1}^{L_k}(I_k R_{kl})$$

where I_k represents the stated importance of the k^{th} attribute and where $\sum I_k$=1. Furthermore, R_{kl} represents the rating of the l^{th} of the k^{th} attribute, normalized so that the lowest rated level of each attribute has a scaled rating of 0 and the highest rated level of each attribute has a scaled rating of 1. L_k is the number of levels over which the k^{th} attribute is varied, *K* is the number of attributes. W_{kl} is a dummy variable that equals to 1 if apple product *j* processes the l^{th} level of the k^{th} attribute, and 0 if otherwise. The term $I_k R_{kl}$ can be interpreted as a utility "part-worth," which is the utility provided from the l^{th} level of the k^{th} attribute. This part-worth is analogous to the coefficients in a random utility model estimated from a conjoint analysis, with W_{kl} being the explanatory variable for presence or absence in the conjoint analysis.

Lastly, the willingness-to-pay to purchase one product versus another was calculated by dividing equation (1) by the "part-worth" on price, which represents the marginal utility of income (Norwood and Lusk, 2011). The forecasted bids were shown to people together with the relative importance of each attribute level by means of a bar chart (see Figure 3.3).

Figure 3.3 Step 3



Of course, the forecasted WTP values may differ from what people are actually willing to pay. However, the only way for people to change their bids was to go back and change the relative importance of the attributes provided in step 2. This step forces an internal consistency between economic valuations and the underlying utility function that maps preferences for agricultural production attributes to the apples produced under different conditions.

Participants had the opportunity to change the relative importance of each product attribute by means of a drop-down box. Simultaneous with the adjustment of the attribute importance, people could see how their bids changed for the three types of apples as their ratings changed. Once the participants were satisfied with their bids, they hit the submit button. The final bids appeared on the screen. One production system (i.e., conventional, organic or integrated) was randomly selected. The highest bidder for the chosen type of apples was announced as the winner of the auction. (S)he took the chosen apples home after paying the second highest bid.

Our computer program kept track of subject's initial ratings in steps 1 and 2. These are the data that a marketing analyst would normally use to compute subjects' WTP and market share. However, these reflect the subjects' hypothetical ratings before learning that bids would subsequently be entered into an auction. By comparing the implied WTP values that resulted after subjects first completed steps 1 and 2 to the final submitted bids, we can determine the effect of the CACM procedure (and the move from Non-adjusted to real economic environments) on consumers' valuations.

3.3.3 Analytical procedures

To understand the differences between participants' Non-adjusted and non-hypothetical bids, a Tobit model was specified because the Non-adjusted bids were lower than or equal to the non-hypothetical ones in all cases. The "y" was the difference between the calibrate auction results and Non-adjusted bids.

3.4 Results

The results of this study are presented in three stages. First, the results obtained from the CACM are reported. Second, a very brief descriptive analysis of the survey questions is presented. Finally, the results from the Tobit model are presented to understand the factors that explain the differences in consumer valuation in Non-adjusted and calibrate auction settings.

3.4.1 CACM results

The main results from the CACM are shown in Table 3.1. We start by reporting the bids for a kilogram of apples from each of the three production systems both before and after making adjustments to their bids. In the first step of the experiment, or before the adjustment, the average bid for a kilogram of apples from the conventional production system was 1.15€. This value increased to 3.65€ for apples from integrated production systems and to 4.14€ for apples from organic production systems. It is interesting to see that after the adjustment[5], the average bid for a conventional system remained the same

[5] After learning that bids would be entered into a real auction.

1.15€. However, the value for the apples from the integrated production systems was of 2.76€. This finding implies a decrease of 24% compared to the initial case. Furthermore, the average bid for apples from organic production systems was 3.15€, which was 0.99€ less than the initial "hypothetical" bid.

Table 3.4 Distribution of the bids (Euros)

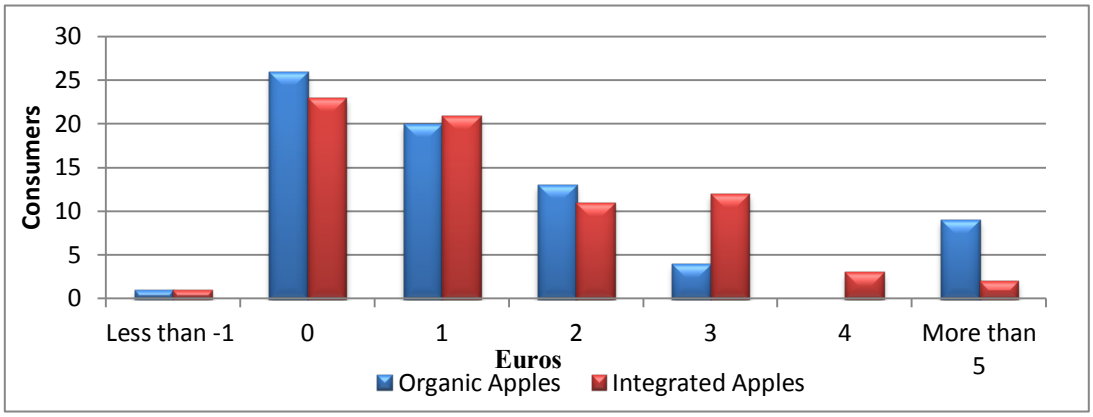
	Conventional	**Integrated**	**Organic**
Before the adjustment (hypothetical bid)			
Minimum	0.30	0.71	0.67
Median	1.00	3.65	3.90
Mean	1.15	3.65	4.14
Max	2.50	6.87	10.00
Standard deviation	0.46	1.59	2.20
After the adjustment (non hypothetical bid)			
Minimum	0.30	0.36	0.67
Median	1.00	2.36	2.67
Mean	1.15	2.76	3.15
Max	2.50	6.61	9.30
Standard deviation	0.46	1.53	1.85

These results suggest that participants positively valued environmentally friendly production systems. This result, along with the already declared high WTP for organic foods when their prices decrease, illustrates the potential market for organic and integrated foods in Spain. However, this market probably requires better designed pricing and promotional strategies to inform consumers about the positive effects of such products on the environment and needs to take into account the real WTP. Additionally, results the show that participants' revealed a higher WTP for organic and integrated apples in hypothetical conjoint experiments than in incentive compatible settings. These results are consistent with findings by List and Gallet (2001) and Lusk and Schroeder (2004). In our case, the non-adjusted bias resulted primarily from the relative priority to price.

Figure 3.4 illustrates the differences between the WTP for the initial non-adjusted and the submitted non-hypothetical calibrated bids for a kilogram of both organic and integrated apples. About 43% of people revealed a difference equal or less than 0.20 € between the non-adjusted and the real economic bids for the two production systems. This finding

indicates that more than the 40% of the sample answered the non-adjusted bids in a similar way to the real economic calibrated bids.

Fig. 3.4 Marginal Willingness-to-pay for organic and integrated apples



To deeply analyze the differences between the non-adjusted and non-hypothetical adjusted bids, Figures 3.5 and 3.6 show respondents' average rankings of the relative importance of the attributes associated to the productions systems for ratings both before and after adjustments. As expected, the most important attribute was price[6]. However, it can be observed that the environmental protection attribute was also very important for the sample, followed by the use of pesticides. The rest of the attributes were considered as equally important. It must also be highlighted that after the adjustment, price relevance increased in about 16%. However, it is interesting to observe that when respondents modified the relative importance of the rest of the attributes to increase the importance of price, they maintained almost the same ranking order as they revealed in the hypothetical experiment, which validates the rationality of their first step responses.

[6] During the survey, consumers were asked about the role of price in their decisions when purchasing organic food. More than 81% of consumers placed high importance either on questions about price, price comparison or promotions. (At the time of shopping I compare the prices of possible alternatives; I pay attention to offers when I buy food; at the time of buying a product its price is very important to me.)

Fig. 3.5 Hypothetical bid: Relative Importance of Attributes (before adjustment)

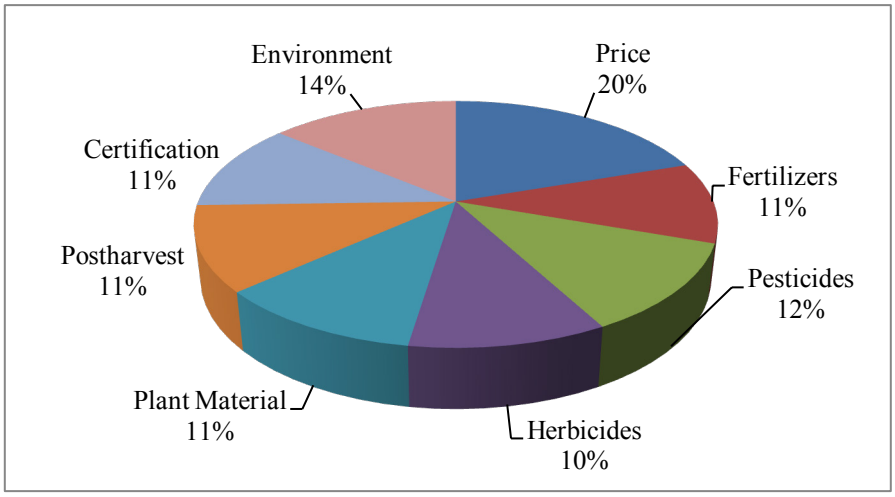


Fig. 3.6 Incentive compatible bid: Relative Importance of Attributes (after the adjustment)

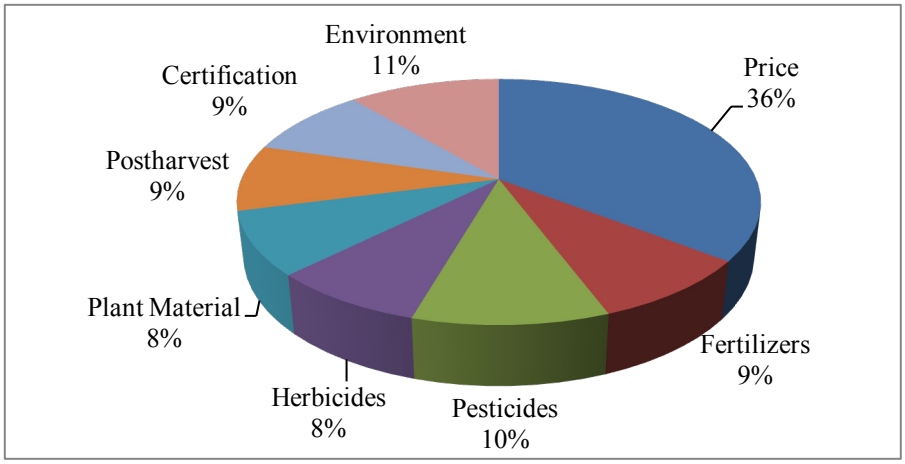


Table 3.5 shows the average WTP for selected changes in all attribute levels for apples, or the WTP for shifting from one level on a specific attribute to another level of the same attribute. The results are presented for the two bids. In the setting previous to the adjustment, we can observe a positive WTP in shifting from conventional production to organic or integrated production for all attributes. However, no significant differences can be observed if we compare the two sustainable production systems. For the real economic setting, respondents were not willing to pay to change between environmentally friendly productions systems, as they preferred the conventional setting.

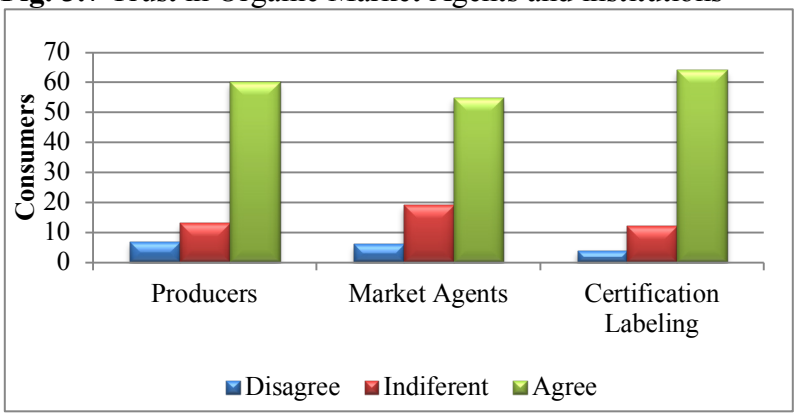
Table 3.5 WTP Values for Selected Changes in Apples Production (Euros)

	Mean Bid 1	Mean Bid 2
Fertilizers		
The use of mineral and chemical synthesis fertilizers is prohibited vs It allows the use of three types of fertilizers	0.36*	-0.11
The obligatory control enhances the application of natural fertilizers and reduces the use of chemical synthesis fertilizers vs It allows the use of three types of fertilizers	0.30*	-0.15
The use of mineral and chemical synthesis fertilizers is prohibited vs The obligatory control enhances the application of natural fertilizers and reduces the use of chemical synthesis fertilizers	0.06	0.04
Pesticides		
The use of synthetic chemicals product is prohibited vs Allows the use of synthetic chemicals	0.41*	-0.12
Allows the use of synthetic chemicals, as long as it is a rational application vs Allows the use of synthetic chemicals	0.33*	-0.16
The use of synthetic chemicals products is prohibited vs Allows the use of synthetic chemicals, as long as it is a rational application	0.08	0.04
Herbicides		
The use of herbicides is prohibited vs It allows the use of herbicides	0.37*	-0.12
Only allows the use of certain herbicides in some conditions vs It allows the use of herbicides	0.29*	-0.15
The use of herbicides is prohibited vs Only allows the use of certain herbicides in some conditions	0.07	0.04
Plant Material		
Used only certified integrated plant material vs No need for associated certification	0.37*	-0.15
Used only certified integrated plant material vs No need for associated certification	0.32*	-0.17
Used only certified integrated plant material vs Used only certified integrated plant material	0.05	0.02
Postharvest treatment		
Prohibited unless they are natural products vs It allows the use of any post harvest treatment according to law	0.37*	-0.15
Only allows the use of post harvest treatments authorized by law if they are technically justified vs It allows the use of any post harvest treatment according to law	0.32*	-0.17
Prohibited unless they are natural products vs Only allows the use of post harvest treatments authorized by law if they are technically justified	0.05	0.02
Certification		
Organic certification production vs There are not certification	0.38*	-0.12
Integrated production certification vs There are not certification	0.32*	-0.16
Organic certification production vs Integrated production certification	0.06	0.05
Environmental Impact		
Produce supporting biodiversity, respecting the environment vs Not explicitly consider the environmental impact	0.46*	-0.15
Produce, respecting the environment vs Not explicitly consider the environmental impact	0.38*	-0.19
Produce supporting biodiversity, respecting the environment vs Produce, respecting the environment.	0.08	0.04

3.4.2 Descriptive analysis

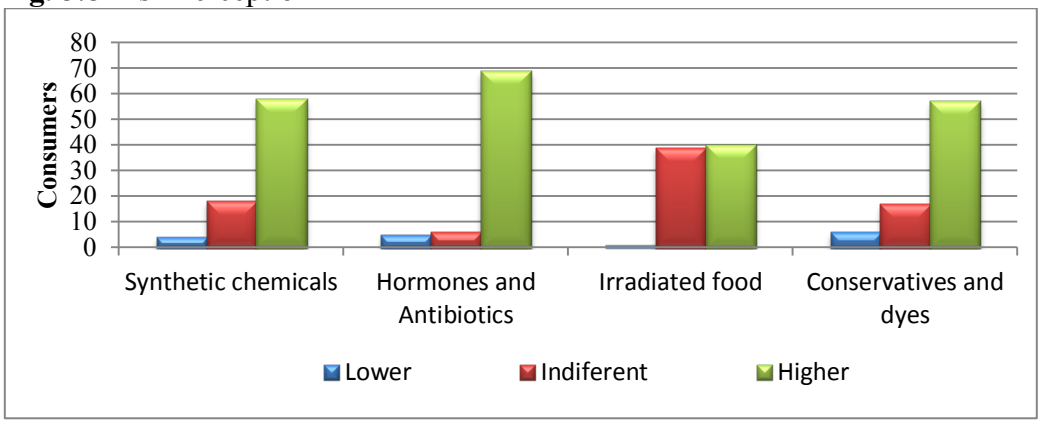
Considering the survey responses, we can state that Spanish consumers revealed high confidence in the organic market agents, producers and especially certification labeling (see Figure 3.7). Second, it is notable that nearly 70% of the sample was concerned with the use of hormones and antibiotics on food production, followed by concerns for synthetic additives and chemicals (see Figure 3.8). However, a clear position regarding attitudes toward irradiation technology was not revealed due to the high level of indifference, which might indicate a lack of public knowledge regarding this technology.

Fig. 3.7 Trust in Organic Market Agents and institutions



Question 1: I trust organic food producers; Question 2: I trust organic food market agents; Question 3: I trust the certification and labeling of organic foods

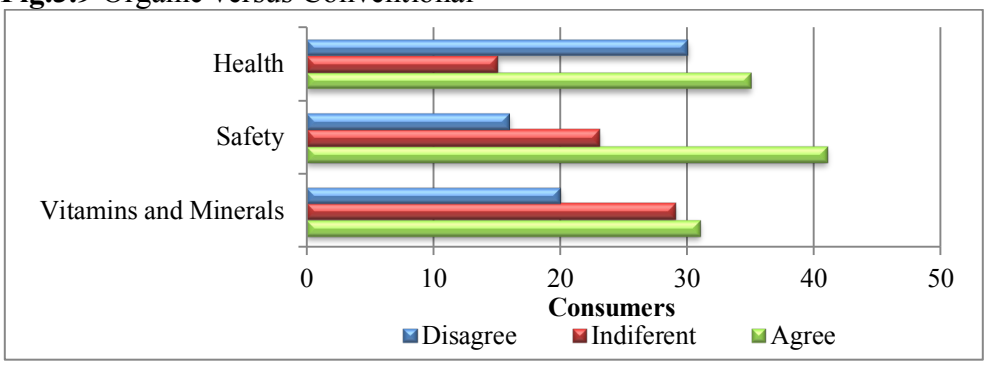
Fig. 3.8 Risk Perception



Question 1: Could you tell me which is the perceived health risk for regularly consuming processed food grown with pesticides and other chemicals?; Question 2: Could you tell me which is the perceived health risk for consuming food from animal origin treated with hormones and antibiotics?; Question 3: Could you tell me which is the perceived health risk for regularly consuming irradiated food?; Question 4: Could you tell me which is the perceived health risk for regularly consuming foods with preservatives and artificial colors?

In addition, some questions related to general environmental concerns were also asked in the survey. Almost all of the participants showed a some degree of environmental concern. More than 86% of the respondents thought it was important to recycle their garbage, while nearly 46% were willing to consume foods packed with recyclable materials. Next, the respondents were requested to perform a comparison between conventional and organic food (see Figure 3.9). Nearly 52% of the participants perceived organic production as safer than conventional foods. However, there was no agreement among the respondents when talking about health and the level of vitamins and minerals in food products. On average, 44% of the respondents were worried about health and therefore tried to consume low fat foods that are rich in vitamins.

Fig.3.9 Organic versus Conventional



Question 1: Organic foods are as healthy as conventional foods; Question 2: Organic foods are as safety as conventional foods; Question 3: Organic foods have the same content of vitamin and minerals than conventional foods

3.4.3 Factors explaining the differences in consumer valuation for both Non-adjusted and non-hypothetical calibrate settings.

To control for socioeconomic and attitudinal differences among the respondents, a Tobit analysis was performed for respondent WTP differences between the first and second bids (see Table 3.6). The results from the organic and integrated production systems are shown in Table 3.7.

Table 3.6 Tobit model variables description

Variable	Definition	Type*
WTP D	*Differences between the WTP of the hypothetic and non hypothetical bit.*	*C*
Gender	*Female=1*	*D*
Childs at home	Childs at home =1	D
Age1	Younger people	D
Age2	Older people	
Education level 1	Less educated	D
Education level 2	More educated	
Income 1	Low income	D
Income 2	High income	
SN1	Subjective norms	D
SN2		
R1	*Risk perception agriculture*	D
R2		
T1	*Trust organic agents*	D
T2		
P 1	Attitude towards price	D
P2		
A1	Perception ecologic vs. conventional	D
A2		
EA1	Environmental attitude	D
EA2		
Price importance1	Price importance	D
Price importance2		
Health concern1	Health concern	D
Health concern2		
Subjective Knowledge 1	Subjective knowledge	D
Subjective Knowledge 2		
Objective Knowledge	Objective Knowledge	D

**D=Dummy variable, O=ordered variable, C=Continuous variable.*

When valuing organic apples, men are less consistent than women regarding former significant differences between the non-adjusted and the incentive compatible bids (WTP3-WTP2). Other significant elements that affect respondents' differences in their WTP for organic systems are trust and price importance. When respondents assigned a higher relative importance to the price attribute, the difference between the bids was larger. In the case of trust, either high or low levels of trust in organic marketing agents had a negative impact on the differences between the bids. Furthermore, subjective knowledge and health concerns had positive impacts on the difference between the hypothetical and the incentive compatible bids. The contrary trend occurs with objective knowledge; the higher the objective knowledge level, the lower is the differences between the bids. Lastly, the results

show that respondent perception of organic food as being unequal[7] to conventional food is also significant. Respondents that perceived organic food as being unequal to conventional food were more consistent between their theoretical and incentive compatible bids.

Table 3.7 Determinants of consumers WTP differences between the first and second bits for integrated and organic apples.

	Integrated		**Organic**	
Variable	**Coef.**	**P**	**Coef.**	**P**
Gender	0.2003	0.197	0.4439	0.053
Childs at home	0.0991	0.592	-0.2530	0.304
Age1	0.1031	0.676	0.0495	0.882
Age2	0.2994	0.182	0.2307	0.408
Education Level 1	-0.6041	0.025	0.0867	0.8
Education Level 2	-0.2691	0.301	0.0733	0.834
Income 1	-0.3685	0.039	-0.2284	0.343
Income 2	-0.0259	0.897	-0.0666	0.805
SN1	-0.3144	0.092	-0.2348	0.375
SN2	-0.5200	0.048	-0.2125	0.518
R1	-0.4635	0.006	0.0679	0.75
R2	0.1499	0.419	0.2489	0.329
T1	0.4053	0.066	0.8916	0.005
T2	0.0255	0.901	0.5475	0.053
P1	-0.0711	0.714	0.2681	0.336
P2	0.4365	0.015	0.8297	0.002
A1	0.3414	0.083	0.7194	0.01
A2	-0.3250	0.091	-0.2451	0.36
EA1	-0.0749	0.694	0.1356	0.609
EA2	-0.0003	0.999	0.0538	0.846
Price Importance1	-0.5441	0.234	0.3121	0.631
Price Importance2	-0.1138	0.548	0.4494	0.11
Health Concern 1	0.1364	0.678	-1.4275	0.118
Health Concern 2	-0.4065	0.057	0.7562	0.011
Subjetctive Konwledge 1	-0.4195	0.012	0.8221	0.116
Subjetcitve Knowledge 2	-0.6758	0.07	2.9265	0.002
Objective Konwledege	-0.4919	0.013	-0.9023	0.003
Cons	2.8541	0	0.2510	0.747

***Integrated:** Obs =72, Log likelihood =-39.89, LRchi2(36) = 136.68, Pseudo R2 = 0.6314
***Organic:** Obs = 72, Log likelihood =-55.46, LRchi2(36) = 125.75, Pseudo R2 = 0.5314

The results obtained for the integrated system were similar to those mentioned above for the organic system, in relation to price importance, trust and objective knowledge. Other significant elements that affected respondents' differences in their WTP for integrated systems were income and education level. The higher the education and income levels, the lower were the differences between the bids. In addition, risk perception showed that

[7] Equally secure, equally safe and with the same level of vitamins and minerals.

respondents with high levels of risk revealed significant differences between their non-adjusted and non-hypothetical calibrated WTP. Finally, it can be observed that subjective knowledge and health concern were significant and had negative impacts on respondent differences between their non-adjusted and incentive compatible WTP.

3.5 Conclusions

This study compared a non-adjusted conjoint valuation experiment and an incentive compatible calibrate experiment using the Calibrated Auction – Conjoint Valuation Method proposed by Norwood and Lusk (2011). The CACM methodology has been used to estimate people's values regarding environmentally friendly production systems, namely organic and integrated farming. The advantage of the CACM is that the auction bid can be decomposed to identify attributes and attribute levels that render people willing to pay more for an organic or integrated apple in comparison to a conventional one. The CACM methodology allows respondents to develop a rational behavior in the bidding experiment. In addition, this study attempts to value the differences between a non-adjusted and an incentive-compatible choice for the same respondent and within a unique experiment.

Our results show that people's valuations of apples are affected by the production system and that Spanish respondents place a higher value on organic products in comparison to ones obtained from integrated or conventional production systems. On average, respondents were willing to pay 3.5 and 4.14 Euros for a kilogram of integrated and organic apples, respectively, for the non-adjusted bid. For the incentive-compatible experiment, the biding decreased to 2.76 and 3.15 Euros for a kilogram of integrated and organic apples, respectively.

In addition, among a set of attributes associated with a production system (e.g., price; environmental impact; the use of fertilizers, pesticides and herbicides; plant material; post-harvest treatments; and certification), price had a higher relative importance, followed by the environmental impact of the production system. This fact would explain, or at least portray, the differences found when we compared results from a non-adjusted and an incentive-compatible setting. However, it is important to highlight that when respondents decreased their WTP due to the introduction of monetary incentives, this was done in a

rational way or that the relative importance of the other attributes was maintained in the same relative proportion as was done in the first bidding.

Our study also suggests that there are some factors that can explain why participants bid in a different way in non-adjusted versus non-hypothetical calibrated settings. In particular, more inconsistencies have been found in relation to gender, respondents' knowledge about organic production and practices, risk perception, price importance and health concerns.

Furthermore, it will be interesting for future research to explore if the order of bids matters. That is, if we will obtain the same results if the elicitation bids is don for the organic products and the forecasted for conventional and integrated ones.

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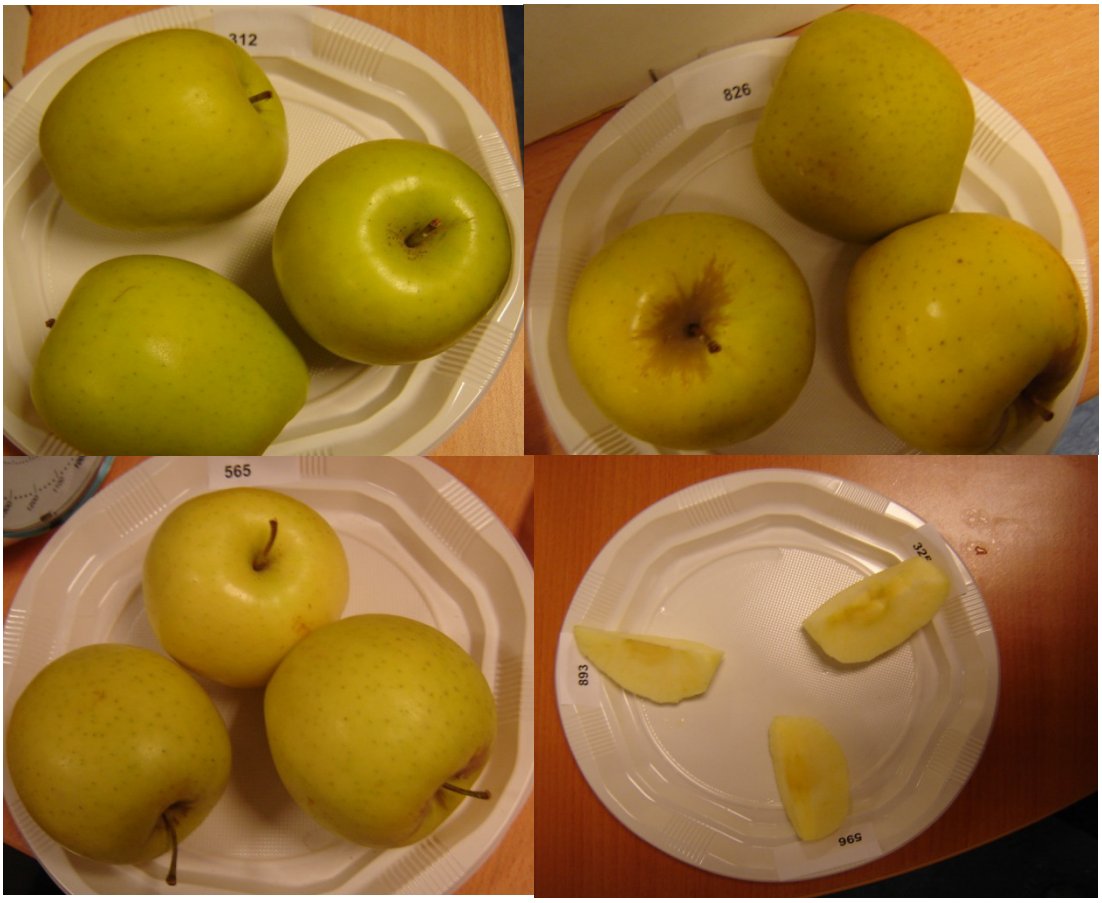
CHAPTER 4

The role of sensory experience on Spanish consumer's willingness to pay for sustainable produced food



ABSTRACT

For a variety of reasons, Spanish growth in demand for organic and integrated products has not kept up with supply. This work focused on the effect of information and sensory issues on purchase behaviour in relation to sustainable agricultural production. Using experimental auctions and results from (trained and untrained) sensory Panels, we studied the preferences for attributes related to food sustainability. Spanish consumers have a positive attitude towards sustainable food due to environmental concerns, health concerns, and trust in certification and market agents. However, the premium they are willing to pay for these products is lower than the current market price. Furthermore, "search" and sensory "experience" influence consumers' purchase behavior.

4.1 Introduction

The growing interests of European consumers in the environmental effects of conventional agriculture have raised interest in sustainability (Chen, 2007, FACUA, 2008). Sustainable agriculture can be defined as a way of production that causes less degradation of the agro-ecological system than conventional agriculture (Quenum, 2010). This designation encompasses both organic and integrated agriculture. Organic farming has been identified as a production system that combines improved environmental practices and the application of high-animal welfare standards, as well as prohibiting the use of synthetic agrochemicals, drugs and hormones and restricting the use of chemical fertilizers and pesticides (Magistris and García, 2006; Michaledou and Hassan, 2009; Miret, 2004). Integrated farming can be defined as an agricultural system which uses resources and natural regulation mechanisms to avoid adverse contributions to the environment and also ensures long-term sustainable agriculture combining the use of biological pest controls and the use of traditional techniques based on agrochemicals (International Organization for Biological Control, IOBC, 2004).

Worldwide land devoted to organic farming has experienced a growth during the last decade, with a total of 37.2 million hectares in 2009. However, only a quarter is devoted to cropped area[8] (Lockie et al., 2004; Michaledou and Hassan, 2009; Willer, 2011). The geographical areas with larger amounts of land allocated to organic production are Oceania, Europe and Latin America. Within Europe, Spain is the country with a higher number of hectares allocated to organic production (Willer, 2011) from the Faostat database[9] about 1,602,900 ha [10], which represents 0.58% of total agricultural area about 27680000 ha, with more than 25,000 producers. Organic land growth has exceeded 25% annually (Willer and Yussefi, 2008; Briz and Ward, 2009; Willer, 2011).

In addition to the land allocated to organic agriculture, the market value for organic food and feed has also increased during the last years. Europe domestic sales of organic food and feed in 2008 were estimated at 18 billion Euros, with Germany (almost 6 billion Euros),

[8] Arable land and permanent crops.
[9] Last available data is from 2009.
[10] Agricultural area certified organic + agricultural area in conversion to organic.

France (more than 3 billion Euros), U.K. (almost 2 billion Euros) and Italy (almost 1.5 billion Euros) the most outstanding countries (Willer, 2011). In Spain the market accounts for only 905 million Euros (MAPA, 2007; Michaledou and Hassan, 2009; Willer, 2011). This can be explained because, although devoting significant share of arable land to organic production, this is mainly concentrated in crops such as almonds, olive trees and vineyards planted in non-irrigated areas. Moreover, most of the Spanish production is exported. In fact, Italy and Spain concentrate more than the 87% of the European export market for organic food and feed, 900 and 315 million Euros, respectively (Willer, 2011).

Regarding to integrated agriculture, it is important to highlight that integrated farming is not considered by any European regulation; therefore each member state has its own regulation, resulting in consequent differences among countries. Nevertheless, there is an initiative named "European Initiative for Sustainable Development in Agriculture (EISA)" that attempts to eliminate the gaps between the different European regulations regarding integrated production by establishing a definition for integrated farming (IF) while setting certain guidelines at the European level. In Spain, IF is regulated by REAL DECRETO 1201/2002, which establishes the general characteristics and requirements for integrated agriculture. According to a survey done in 2010 by the Spanish Ministry of Agriculture, the nation dedicates 601,394 hectares to integrated production. However, there is not any common institution (at national level) regulating the market and, consequently it differs in each region (Cataluña, Andalucía, Aragón, Canarias, Castilla-León, Extremadura, Galicia, La Rioja, Murcia, Navarra and País Vasco). In addition there is not any available data about market value and commercialisation of integrated products in Spain.

The potential development for organic and integrated agriculture and food in the Spanish market is still very large. However, a succession of interrelated factors such as the existence of relatively high prices, the export orientation of the Spanish producers, the limited availability of the product in most conventional retailers and the lack of consumer knowledge about what exactly organic and integrated products are, have determined that the domestic demand growth has been lower than supply (Tarkiainen and Sundqvist; 2006; Fotopoulos and Krystallis, 2002). Therefore, to increase domestic demand, a better understanding of Spanish consumers' choices regarding sustainable produced food is

needed. Purchasing intentions are measured through consumers' willingness to pay (WTP) for organic and integrated food.

Although there is a vast literature dealing with consumers' WTP for organic foods, as well as about the role of sensory attributes in the food choice (e.g. Cardello and Schutz, 2006; Ishii et al., 2007; Gil et al., 2000; Krystallis and Chryssohoidis, 2005; Batte et al. 2007), this is the first attempt to combine both experiments, WTP and sensory tests for the case of sustainable food. Previously, Poole and Martínez (2006 and 2007) and Combris et al. (2009) showed the importance of experience attributes on individuals quality perception of food and on the final food choice.

In the present study, consumers' willingness to pay is assessed through an experimental auction. Two auctions have been designed: the first consists on consumers' evaluation of different food options based on search attributes (before purchase) and the second after tasting it (simulating a post purchasing situation). In between a hedonic sensory test is performed. Simultaneously, as a complementary exercise, a trained panel sensory test has been employed to identify the main organoleptic characteristics that consumers associate with the hedonic taste satisfaction. Finally, factors affecting consumers' WTP differences in the two auctions are analyzed.

The structure of the paper is as follows. First, a background on the impact of consumption expertise, understanding it as actual consumption experience, on consumers purchase intention and its willingness to pay is presented. Next, we report the description of the sample, the structure of the sensory test and the product under analysis. Third, the experimental design and statistical analysis were presented. Finally, the empirical estimation results are unveiled and some conclusions are stated.

4.2 The role of consumption expertise and food information on consumers purchase behaviour

Determinants of consumers' behaviour towards food mainly depend on: 1) sensory aspects of food such as taste, smell and texture, achieved by means of personal experiences towards food (Shaw et al., 2007); 2) non-food elements such as, available information as well as

environmental and social factors (Bell and Meiselman, 1995; Eofertmans et al., 2001; Rozin and Tuorila, 1993; Shaw et al., 2007); and 3) cognitive factors, which emphasize the development of mental structures and processes that may vary among individuals (Magistris and Gracia, 2008; Peter and Olson, 2005). This work is focused on the role of information and sensory aspects in shaping individuals purchase behaviour for a sustainable produced fruit (organic and integrated apples).

There are two main types of information named "search" information (through inspection) and "experience" information derived by consumers own experience through purchasing and consumption (Nelson, 1970; Poole et al., 2007). The role of "search" information can be relevant for the case of sustainable food -namely organic and integrated food. Although foods are generally considered as economic goods, sustainable produced foods have attributes that cannot only be revealed by visual inspection or consumption (Bonti-Ankomah and Yiridoe, 2006). However, some economic studies have settled organic products as trust assets (Andersen and Philipsen, 1998; Nelson, 1970; Giannakas, 2002). That is, the organic characteristics are difficult or, even in some cases, impossible to detect, but nevertheless play an important role for the buyer (Andersen and Philipsen, 1998). The same happens with other attributes such as quality distinction. Consequently, certification has been developed to transform the confidence characteristics into searchable attributes, allowing the buyers to have the proper information to evaluate more clearly the different alternatives before purchasing a specific product (Bonti-Ankomah and Yiridoe, 2006).

In addition to the "search" information, when talking about fruit, the role of "sensory experience" is especially important and changeable. Sensory experience is formed by two main components: the extrinsic perception (size, texture and shape) and the intrinsic perception (texture, sweetness, flavour etc.) (Poole et al., 2007). However, two fruits growing alongside each other on a tree will develop different levels of sweetness, acidity, flavour and texture. Even different sides of the same fruit can have different sensory characteristics. This variability in quality is compounded by several technological and supply factors. Thus, consumers are often faced with a high degree of variability for fruits purchased from the same batch, as well as among sequential shopping trips (Harker et al., 2002a).

The importance of health and environment in determining consumer choice of organic food is well known (Fotopoulos and Krystallis, 2002; Jolly, 1991; Scheifferstein and Ophiusa, 1998; Shaw et. al., 2007; Makatouni, 2002; Zanoli and Naspetti, 2002; Kotler et al., 2005; O'Donnovan, 2002; Ougthon and Ritson, 2007; Grunert and Juhl, 1995; Padel and Foster, 2005; Chryssohoidis and Krystallis, 2005; Chen, 2007; Magistris and Gracia, 2008; Kuhar and Juvanic, 2005), and has been measured by many different methods, such as focus groups and surveys (when searching for qualitative information), conjoint analysis, contingent valuation, choice modelling and bids, among others (when searching for quantitative data) (Hoffman et al., 1993). In order to value individuals purchase intention towards food, the non-hypothetical methods have the advantage of reducing overestimation of answers because participants have the opportunity to actually buy or get the valued product. Indeed, in a real trade situation there is no interest from buyers to reveal their maximum price, unless this does not affect the price they have to pay. This is exactly what happens in the experimental auction method: participants are assured that a selling price will be settled independently of their own maximum buying price (Combris et al., 2009, Poole et al., 2007). The principal advantage of experimental auctions is that real product and real money is used. Therefore, the procedure replicates as closely as possible the actual purchase decision process.

The relevance of "experience" information in food choices has been considered by Lange et al. (2002) and Noussair et al., (2004) that compare hedonic ratings (obtained from sensory analysis) and experimental auctions to evaluate food preferences. They concluded that there is no reason to use auctions to find out the average preferences of consumers regarding to a specific good. They state that hedonic rating provided similar aggregate result and it is easier to conduct. In contrast, Poole et al. (2007), propose an experiment to check if the bidding behaviour might be influenced by the hedonic rating for the particular case of mandarins. They employed an experimental auction to test fruit quality perceptions by evaluating consumers' WTP after three alternative sensory experiments (visual appearance, touching and peeling, and tasting). They conclude that "experience" modifies product quality perceptions and scoring behaviour, as well as it is likely to affect repurchase decisions. More recently, an empirical combination of sensory and economic experiments was also developed by Combris et al. (2009). They developed a protocol for investigating

the influence of food product characteristics (sensory attributes) and information (labels) on consumer preferences and willingness to pay for wine. They conclude that experience plays a very important role in defining individuals' perception and WTP. In addition they also noticed that personal experience, derived from a blind tasting, is significative more important than label information regarding "appellation of origin" (what we named "search" information) for shaping WTP.

The impact of "experience" and "search" information on individuals purchase behaviour has been taken into account through the theory of "assimilation-contrast". This theory suggests that if the gap between expected and actual experience is small, then consumers will change their perception to be in line with expectations (assimilation) (Deliza and MacFie, 1996). However, if the gap is large, then consumers exaggerate (contrast) the difference and reject the product. Alternatively, when consumers do place high importance to inherent attributes of a product, such as organic or integrated production, they have a broad tolerance to sensory quality. This level of tolerance might be expected if choice is more strongly based on expectations of health or environmental benefits rather than on sensory properties (Harker et al., 2002a).

Based in the former studies our experiment wants to assess by means of a two stage experimental bidding process, the influence of "experience information" in forming consumers WTP for a sustainable food (trust assets) and to value the trade-off with the "search information" attribute of agro-ecosystem preservation.

4.3 Methodological approach

4.3.1 The Data

The survey was conducted to a sample of 80 adults representative of Barcelona population during spring 2010. Respondents were recruited by a professional market research company and they had to meet two criteria: a) to be the primary food purchaser within the household and b) to be a frequent apple purchaser. Table 4.1 shows the main characteristics of respondents. In brief, the sample was made up of 40% men and 60% women. Almost 70% of respondents were in between 35 and 65 years old. The majority of the sample (more than

80%) had finished secondary school and revealed to have medium household income levels (from 1000 to 5000 Euros/month family).

Table 4.1 Socio-demographic characteristics of the sample.

Demographic	N = 80	%	Official Population distribution*
Gender			
Female	48	60	51
Male	32	40	49
Age in years			
18-34	23	29	30
35-49	32	40	29
50-64	23	29	21
65 or older	2	2	20
Education			
Primary school unfinished	1	1	12
Primary school finished	4	5	26
Secondary school unfinished	6	8	25
Secondary school finished	40	50	23
University degree	25	31	14
Post graduated degree	4	5	
Income in Euros			
1000 or less	5	6	No available
1001-2000	28	35	data
2001-3000	26	32	
3001-5000	15	19	
5001 or more	6	8	

4.3.2 The product

The experiment was carried out using 'Golden Delicious' apples. In order to value individuals WTP for agro-ecosystem preservation three different production systems namely, organic, integrated and conventional were selected. All fruits were harvested by a single producer from the area of Lleida[11], between December 2009 and January 2010. Maturity was determined at harvest, and apples were placed in cool storage at 0 ºC for up to 10 weeks. Prior to consumer evaluation, the fruits were removed from storage and stored at

[11] Lleida is a province within Catalonia in the North East of Spain. It is the largest production area of apples in Spain (MAPA 2010)

room temperature of approximately 15º C for up two days. In order to guarantee a homogeneous assortment of apples, the firmness of the apples was measure by means of an Effegi penetrometer (Harker et al. 2002a)[12].

4.3.3 The Experiment

The experiment included eight different sessions which were conducted during two consecutive days in March 2010[13]. The sessions were held in a testing room in Barcelona, the number of participants in each session was ten and each session lasted about one and a half hours.

The experiment was conducted in five stages[14]: 1) welcome and introduction to the experiment; 2) survey; 3) first auction for each kg of apples (organic, integrated and conventional); 4) blind tasting of three apple samples (organic, integrated and conventional); and finally, 5) provision of information about identification of tasted apples and second auction for each kg of apples (organic, integrated and conventional).

During the *second stage*, respondents received the payment of 20 Euros for their participation in the experiment. Respondents were requested to answer a computer-based survey containing questions regarding organic purchase behavior, risk perceptions associated with agricultural products, environmental attitudes, and the influence of social norms on respondent behavior, trust in organic market agents, and the importance of price in food purchases.

The *third stage* of the experiment starts with an explanation about the auction procedure. The auction method used is the single bidding Vickery second-price auction (Vickrey, 1961)[15]. The winning bidder, the one that revealed the highest maximum price for the bid,

[12] Two measurements 180 apart at the equator on the shaded side of the fruit were done, and a small patch of the skin was removed for puncture testing, following Harker et al. (2002b).
[13] Previous to the experiment, a pilot test was conducted with 10 participants (students and colleagues), in order to test the software developed for the experiment and to test the methodology of the auction that would be used.
[14] First of all, a pilot experiment was conducted. Its aim was to test both the "software" developed for the CACM experiment and the methodology that would be used for the auction. A total of 10 participants (students and colleagues) were employed.
[15] There is not an agreement in the literature reading to the number of trial auctions needed. Among the arguments in favor of repeated trials is that the practice allows participants to learn about the auction format improving the accuracy of value estimates (see, e.g., Alfnes and Rickertsen 2003; Hayes et al. 1995; Lusk et al. 2001; Shogren et al. 1994; Shogren et al. 2001). However, Knetsch et al. (2001) find that bids in a repeated-trial auction are influenced by the choice of

paid the second highest bid price and received the kilogram of apples. A first bidding employing two different soft drinks was carried out as an example, allowing respondents to ask questions on the auction mechanism. Once the auction mechanism was fully understood by participants, they were asked to submit three confidential bids, each bid corresponding to a kilo of apples produced under a different system (organic, integrated and conventional production), and write them down on a bidding sheet.

In the *fourth stage* of the experiment a blind tasting for three apple samples, one for each production system (integrated, organic and conventional) was performed. Firstly, respondents tasted and valued the three samples (apple slices) and afterwards they assessed the visual aspect of the entire apple. Apple samples were randomly assigned to the different groups and the acceptability was measured by means of a 9-points hedonic ranking from "I don't like it at all" to "I like it very much".

In the *final sta*ge we revealed which of the apples from the blind tasting came from the conventional, the integrated or the organic system. With this information in mind, a second round of the auction was carried out.

At the end of the two rounds, one round was chosen randomly to determine the binding round. Additionally, one production system (conventional, integrated an organic) was chosen randomly. Once the results were announced, the experiment ended by handing the product to the winner who had to pay the corresponding market-clearing price.

4.4 Results and discussion

Results are presented in three subsections. First, we provide the results from the hedonic sensory test carried out both by respondents and the expert panel. Second, we report results obtained from the auction. Third, we analyze factors affecting respondents' changes related to their willingness-to-pay for organic apples before and after the hedonic sensory test. A regression analysis is used for this purpose. Furthermore, some descriptive statistics about

auction mechanism. In addition, the application of standard economic theory to conservation auctions suggests that single bidding rounds are appropriate (Stoneham et al., 2003, Lactacz-Lohmann and Van de Hamsvoort, 1997; Rolfe and Windle, 2006).

respondents' attitudes and perceptions about organic food are presented as they have been considered as exogenous variables in the regression model. Finally, some conclusions are reported.

4.4.1 Sensory test and trained panel descriptive analysis

The overall scores obtained from the hedonic sensory test of organic, integrated and conventional apples show that respondents prefer conventional apples when valuing appearance while integrated apples are preferred when valuing taste (see table 4.2). Differences are statistically significant if organic and integrated apples are compared for both attributes, appearance and taste (see table 4.2). However, for the evaluation between conventional and organic apples just appearance seems to be significantly different, while for the case of integrated and conventional just taste show significant differences (see table 4.2).

Table 4.2 Means values for consumers' hedonic tests.

	Mean	Std Dev	Min	Max
Appearance of apple				
Organic	5.41	1.71	2	7
Integrated	6.12	1.8	1	9
Conventional	6.48	1.59	2	9
Consumer tasting				
Organic	5.52	1.8	2	9
Integrated	6.63	1.79	2	9
Conventional	5.42	1.96	1	9

	Appearance	Taste
Organic vs Integrated	t=-2,47, p=0.01	t=3.78, p=0.00
Integrated vs Conventional	t=-1.35, p=0.17	t=4.14, p=0.00
Conventional vs Organic	t=-4.01, p=0.00	t=0.50, p=0.61

In order to provide more insight about the relationship between consumer acceptability and the organoleptic characteristics of the apples, a parallel sensory test was carried using a trained panel. The panel tasted the same samples used in the consumers' sensory test. Results from the trained panel was combined with those from the untrained sample of apple consumers to detect which were the main sensory properties that consumers value for organic, integrated and conventional apples (Cardello and Schutz, 2006), and therefore to obtain information regarding how consumers perceive the products and if there are specific

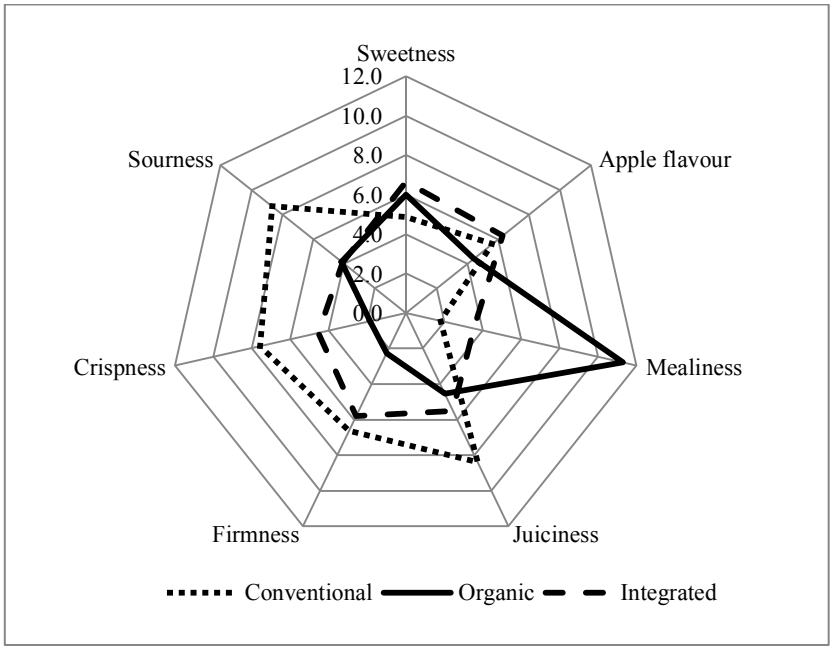
characteristics that make consumers more willing to pay for organic compared to integrated or conventional apples (Ishii et al., 2007). The use of panelists is recommended because common consumers usually lack of the necessary experience, vocabulary and concept alignment to generate quality descriptive data (Ishii et al., 2007).

The sensory panel was composed by nine assessors with wide experience in sensory analysis of apples. The panel was trained by a group of researches with an extensive experience in sensory analysis of fruit (apples and peaches). Each panelist received peeled fruit samples in transparent plastic cups coded using 3-digit, randomly generated numbers. Mineral water and crackers were provided as palate cleansers between samples. Evaluation took place in individual sensory booths in which environmental temperature was held at 20ºC and corrected lighting was used. The samples were scored for the intensity of attributes using 150mm unstructured line (0= absent and 150= extreme), with the exception of firmness which was anchored at 10 = Low and 140 = High. The intensity of the following attributes: sweetness, sourness, crispness, firmness, juiciness, mealiness and apple flavor were evaluated by the panel. The attributes were defined according to definitions given in Harker et al. (2002b) and Harker et al. (2002c).

To identify the sensory attributes associated to each type of apples, first a Principal Component Analysis (PCA) and next an internal preference map was developed. Figure 4.1 shows the mean values of the sensory attributes evaluated by the panelists. We highlight mealiness for organic food juiciness, crispness and sourness for conventional apples and sweetness and apple flavor for integrated produced apples. There are not significant differences between sweetness and apple flavor for integrated apples ($t=-1.14$, $p=0.274$) and neither for juiciness and crispness for organic apples ($t=1.32$, $p=0.213$).

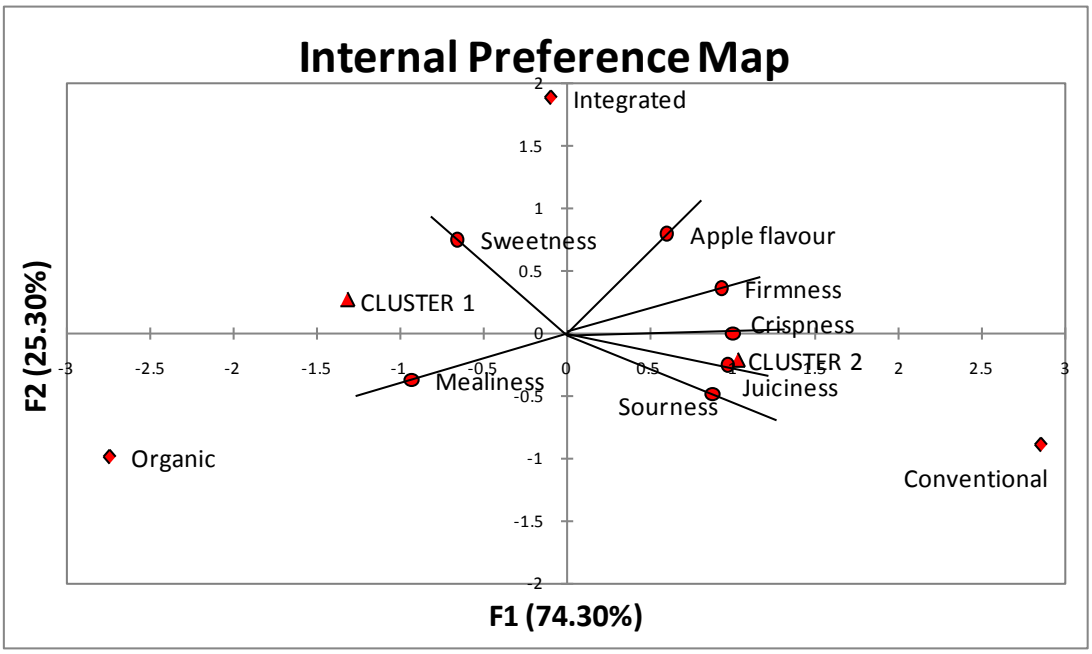
Next, figure 4.2 shows the internal preference map (MPREF) which has been applied to relate the sensory descriptive analysis and the individual hedonic rating allowing us to relate the sensory description done by a trained panel to consumers' sensory preferences regarding apples. Consumers were grouped into two clusters using the K-means method.

Fig. 4.1 Sensory descriptive analysis. Sensory profile for the three types of apples



As can be observed in Figure 4.2, the first cluster (59% of the sample) is associated with a preference towards sustainable produced apples (organic and integrated apples), associated with mealiness and sweetness attributes, while the second cluster (41% of the sample) prefers conventional apples, associated to juiciness, sourness and crispiness.

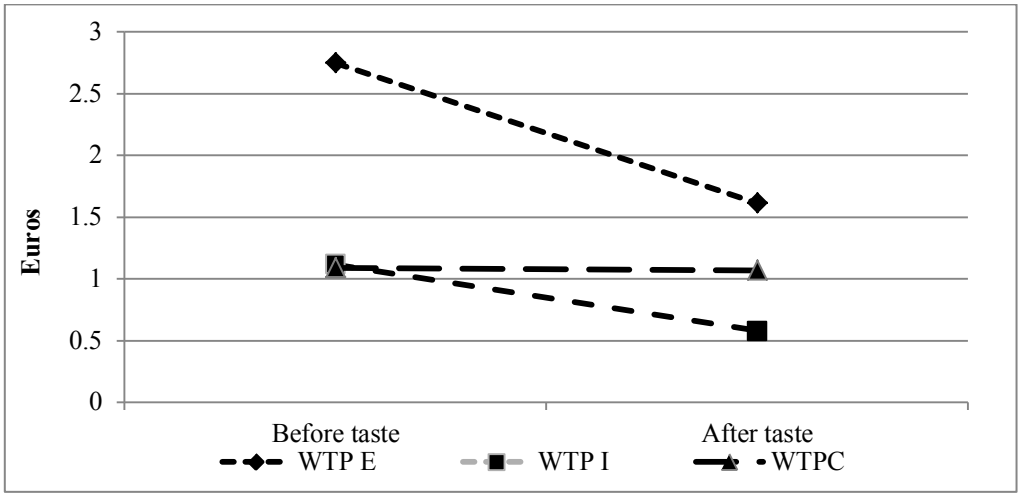
Fig. 4.2 Internal preference map



4.4.2 WTP for organic, integrated and conventional apples

Results from the two stage single round bidding process revealed that the average bid for a conventional apple previous to the sensory test was 1.09€, while average bids for integrated and organic apples were 2.65€ and 2.99€, respectively (Figure 4.3)[16]. Note that, on average, there is a significant WTP for sustainable produced fruit compared to conventional fruit – at least before the sensory test. After the sensory test, the average bid for a conventional apple remained very close (1.07€) while significant decreases were found in the other two production systems. In fact, averages bids decreased by 32.5% for both integrated and organic apples, but they are still higher than the bid for the conventional counterpart. These results combined with the results from the hedonic sensory test show that although "experience" information have a remarkable influence on purchasing intentions, "search" information for sustainable produced certification is very important in defining individuals WTP for fresh food. Consumers do give a higher valuation to integrated and conventional apples for the sensory test but are willing to pay more for organic produced apples. In line with what Harker et al. (2002a) stated consumers purchase motivations are based on health and environmental benefits rather than sensory reasons.

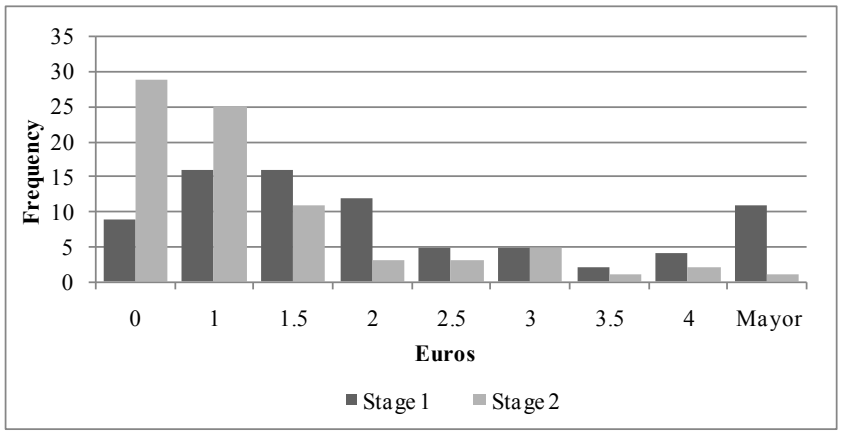
Fig. 4.3 Consumers average WTP for a kilogram of apples before and after the sensory taste.



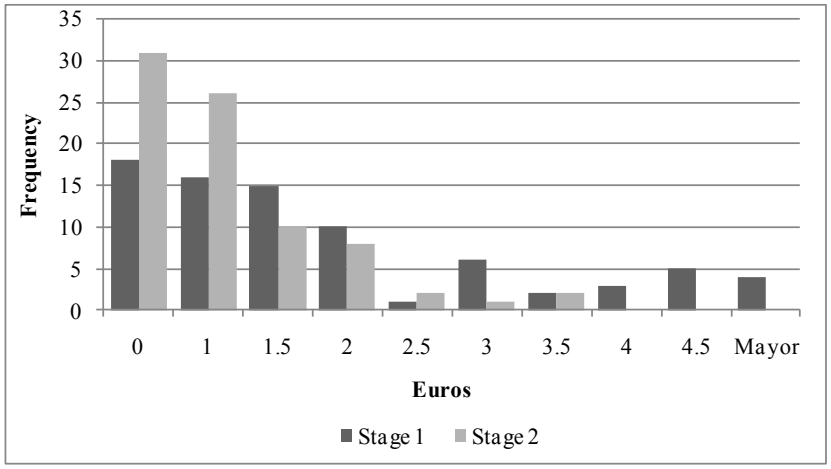
[16] With the WTP, the consumers knew which was organic and which wasn't even though the sensory was blind

The distribution of the premium respondents are willing to pay for both organic and integrated apples compared to the conventional counterpart is shown in Figure 4.4. As can be observed, for the two cases (organic and integrated apples), the WTP curve is moving towards an average lower value after the tasting. In addition, the premium for organic apples is higher than the one revealed for integrated ones. This can respond to the lower knowledge that Spanish consumers do have of the integrated certification scheme. Finally, significant heterogeneity among respondents' preferences towards sustainable produced apples was found.

Fig. 4.4 Distribution of consumers' willingness to pay for organic and integrated apples, before and after the sensory taste.



(A) Organic apples vs. conventional apples



(B) Integrated apples vs. conventional apples

4.4.3 Factors explaining consumer WTP for organic apples

The bidding process has shown us that respondents are willing to pay more for organic apples than for integrated and conventional ones. In addition the internal preference map has indicated that respondents relate organic and integrated apples to sensorial attributes, such as sweetness, while conventional apples are related to crispiness and juiciness. Therefore, we aim at understanding factors affecting consumers' changes in relation to their WTP for organic apples before (ex-ante) and after (ex-post) the sensory test. In other words, we aim at analyzing if consumers previous expectations at purchasing are maintained or not after purchasing and testing.

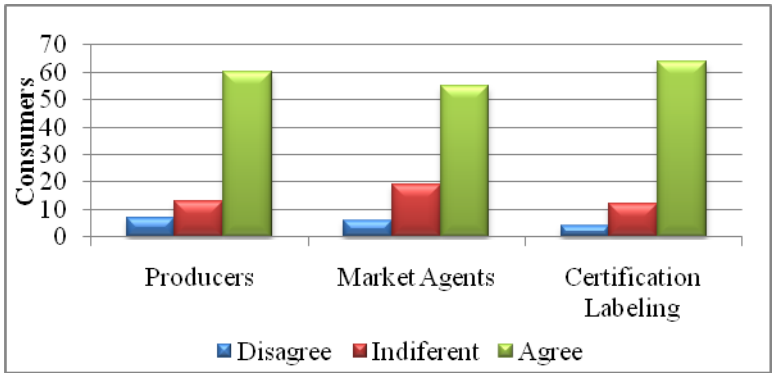
In order to identify the relevance of sensory attributes on defining the final premium consumers are willing to pay for organic apples two parallel models have been defined. The first model draws on the difference between the WTP for the organic apples and the conventional counterpart setting a premium for organic apples. The dependent variable is the difference between consumers' revealed premium for organic apples between the second bid (after the hedonic test) and the first bid (before the sensory test). The second model considers differences between consumers WTP for organic and integrated apples.

The two defined models have the same exogenous variables. Among the explaining factors, we have considered some socioeconomic characteristics of respondents such as: gender, age and education. In addition, the willingness to purchase organic product if it was available in regular stores has been also considered in the analysis – as *Availability*, together with the fact that consumers do already purchase organic apples – *Experience*. Additionally, results from the hedonic sensory test have been considered; more precisely, differences between consumers' valuation of organic and conventional/integrated apples appearance and taste. Finally, a factor analysis of some survey questions was performed in order to define some latent variables, which has been considered relevant on individuals' attitudes towards organic food in previous literature: the influence of social norms, the level of risk perception associated to conventional agriculture, the level of trust on organic agents, price, and finally, the perceived differences between conventional and organic

products. Previous to the results from factor analysis, Figures 4.5 to 4.9 provide some descriptive information about such variables.

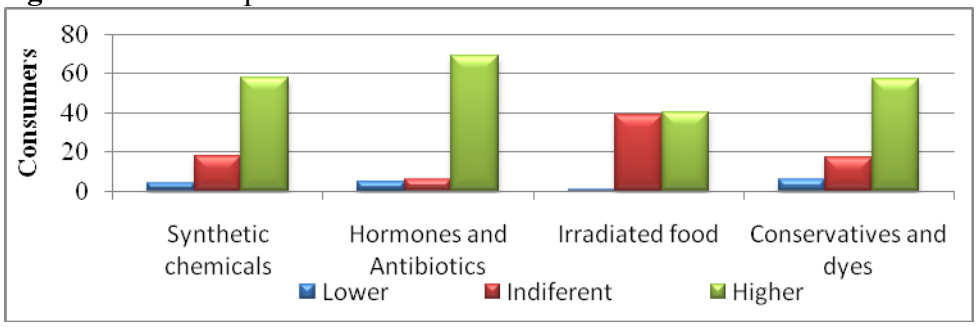
The majority of Spanish consumers revealed high confidence in organic market agents, producers and, especially, certification labeling (Figure 4.5), in line with the strict rules that run this particular market. In addition, it is noticeable that nearly 70% of the sample was concerned with the use of hormones and antibiotics on food production, as well as with the health risk associated to synthetic additives and chemicals (Figure 4.6). However, a clear position regarding attitudes towards irradiation technology was not revealed, which might indicate a lack of public knowledge regarding this technology.

Fig. 4.5 Trust in Organic Market Agents and institutions



Question 1: I trust organic food producers
Question 2: I trust organic food market agents
Question 3: I trust the certification and labeling scheme for organic food

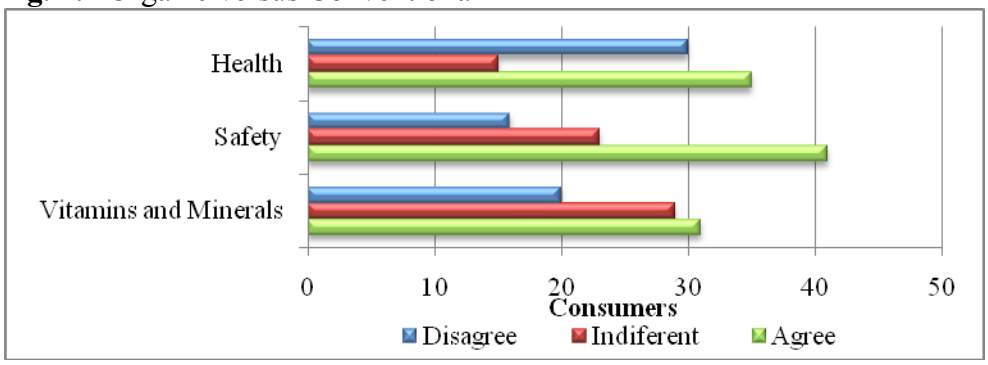
Fig. 4.6 Risk Perception



Question 1: Could you tell me which is the perceived health risk for regularly consuming processed food grown with pesticides and other chemicals?
Question 2: Could you tell me which is the perceived health risk for consuming food from animal origin treated with hormones and antibiotics?
Question 3: Could you tell me which is the perceived health risk for regularly consuming irradiated food
Question 4: Could you tell me which is the perceived health risk for regularly consuming foods with preservatives and artificial colors.

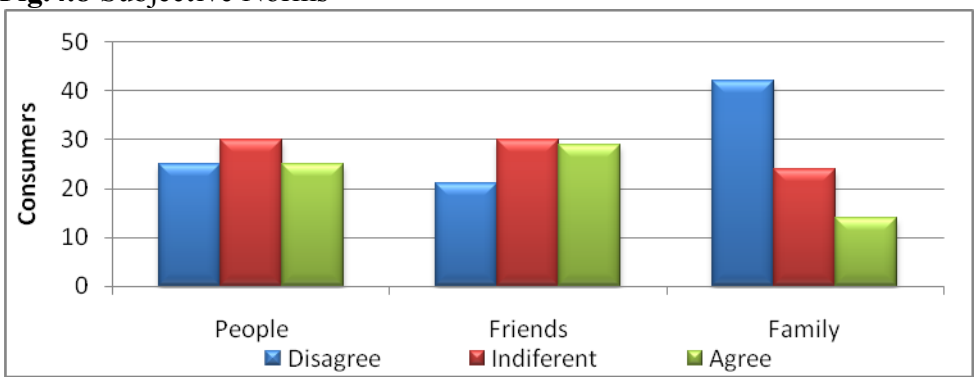
Regarding to consumers' perception of organic food, nearly 52% of participants perceived organic production as safe as conventional food (Figure 4.7). However, there is no agreement among respondents when talking about its impact on health and the content of vitamins and minerals. Finally, the survey also revealed that for almost two thirds of respondents' subjective norms have an impact on their behavior (Figure 4.8) and that opinions from friends and people have more influence than those from their families.

Fig. 4.7 Organic versus Conventional



Question 1: Organic foods are as healthy as conventional foods
Question 2: Organic foods are as safe as conventional foods
Question 3: Organic foods have the same content of vitamin and minerals than conventional foods

Fig.4.8 Subjective Norms



Question 1: People who are important to me believe that I should buy organic food
Question 2: My circle of friends advise me to buy organic food
Question 3: My family thinks we should include in our household food consumption organic products.

Results from factor analysis are shown in Table 4.3. Latent variables have been defined based on scales already verified in the literature (Tarkainen and Sundqvist, 2006; Lockie et al., 2004; Tsakiridou et al., 2006; Lea and Worsley, 2005, and Chen y Li, 2007). The reliability of the resulting factor was tested using the Cronbach's alpha measure of internal reliability and consistency. Results were acceptable as we got a value over 0.7 in all cases but for the last factor with a value of 0.64.

Table 4.3 Cronbach's alpha. (Factorial analysis)

Factors	**Cronbach's α (alpha)**
Factor1 - SN: Subjetctive Norms • My circle of friends advises me to buy organic food. • My family thinks that I should include in my diet organic food. • People that are important to me think that I should buy organic food.	0.85
Factor 2 – R: Risk Perception • Could you indicate me what level of risk supposed to your health consume food grown with pesticides and other synthetics chemicals regularly? • Could you indicate me what level of risk supposed to your health consume animal food treated with hormones and antibiotics? • Could you indicate me what level of risk supposed to your health consume irradiated food regularly? • Could you indicate me what level of risk supposed to your health consume food with additives and dyes regularly?	0.79
Factor 3 – T: Trust in organic market agents and institutions • I trust in the organic food producers • I trust in the suppliers of organic food? • I trust in the certification label veracity of the organic foods	0.83
Factor 4 – P: Price relevance • At the time of purchasing you compare the prices of all possible alternatives • I put attention to the sales or to the sale products when I buy food. • When I purchase the price is very important to me.	0.70
Factor 5- A: Organic vs Conventional • The organic food has the same vitamin and minerals content as the conventional food. • The organic foods are equally safe as conventional ones • The organic foods are equally healthy as the conventional ones.	0.64

Table 4.4 Regression model variables description

Variable	Definition	Type*
DWTP OC	Difference of WTP premium1[17] for organic apples before and after the sensory test.	C
DWTP OI	Difference of WTP premium2[18] for organic apples before and after the sensory test.	C
Appearance O/C & O/I	Difference between the valuation of organic and conventional/integrated apples appearance.	C
Taste O/C & O/I	Difference between the valuation of organic and conventional/integrated apples appearance.	C
Gender	Female=1	D
Age	Older than 49years old =1	D
Education	University education =1	D
SN	Subjective norms	C
R	Risk perception conventional agriculture	C
T	Trust with organic agents	C
P	Attitude towards price	C
O/C	Perception ecologic vs. conventional	C
Availability	I will purchase organic product if it was available in regular stores =1	D
Experience	Consumers do already purchase organic apples=1	D

*D=Dummy variable, C=Continuous variable.

As mentioned above, two regressions have been carried out. The first one considers changes in the consumers' premium they are willing-to-pay for organic vs. conventional apples before and after the sensory experiment, while the second considers changes in the premium between organic and integrated apples. Table 4.4 provides a summary of the exogenous variables considered in both regressions. Estimated parameters are shown in Table 4.5.

As can be observed from Table 4.5, differences between the ex-ante and ex-post WTP for organic apples in comparison to conventional ones mainly depend on sensory variables, such as external appearance. In other words, consumers that in the sensory test have preferred the appearance of conventional vs organic apples are less willing to pay for organic apples after the sensory experience. This result is in line with the output of the preference map that already showed a clear difference between preferences and attributes associated to organic and conventional apples.

[17] Difference between the WTP for organic apples relative to the conventional counterpart.
[18] Difference between the WTP for the organic relative to the integrated counterpart.

Table 4.5 Determinants of consumers WTP differences between bids before and after the sensory test for organic apples[a] relative to their conventional (Model 1) and Integrated (Model 2) counterparts

	Model 1			Model 2		
	DWTP OC			DWTP OI		
Variable	Coef.	T	P	Coef.	T	P
Appearance O/C & O/I	**-.084 (0.40)**	**-2.07**	**0.042**	.241 (0.86)	0.84	0.403
Taste O/C & O/I	.225 (0.39)	0.57	0.569	.052 (0.29)	0.18	0.859
Gender	-.329 (0.39)	-0.82	0.413	-.430 (0.27)	-1.54	0.127
Age	**-1.34 (0.45)**	**-2.97**	**0.004**	**-.689 (0.33)**	**-2.09**	**0.041**
Education	**.757 (0.42)**	**1.79**	**0.078**	.316 (0.28)	1.10	0.277
SN	**.340 (0.14)**	**2.29**	**0.025**	**.262(0.10)**	**2.41**	**0.019**
R	-.237 (0.19)	-1.23	0.223	-.000 (0.14)	-0.00	0.999
T	-.351 (0.22)	-1.56	0.123	-.170(0.15)	-1.07	0.287
P	.114 (0.15)	0.73	0.469	.089 (0.11)	0.78	0.438
O/C	.192 (0.14)	1.31	0.195	**.315 (0.10)**	**2.41**	**0.019**
Availability	-.778 (0.49)	-1.56	0.124	**-.678 (0.36)**	**-1.89**	**0.064**
Experience	.679 (0.59)	1.16	0.252	0.173 (0.42)	0.41	0.686
Cons	-.065 (0.53)	-0.12	0.902	.415 (0.37)	1.10	0.276

[a] See Table 3 for variables definition
***Model 1** Obs = 80, Adjusted R2 = 0.135, R2=0.27, Root MSE= 1.59
***Model 2** Obs = 80, AdjustedR2 = 0.1, R2=0.22, Root MSE= 1.59

The estimated results also reveal that subjective norms influence consumers' WTP for organic apples. Among the socioeconomic variables, the age negatively affects the premium for organic apples. That is, younger respondents increase their willingness to pay for organic apples after the sensory test. This is in line with previous literature which has revealed that younger people are more concerned about the environment (Jolly, 1991; Fotopoulos and Krystallis, 2002; Tsakiridou et al., 2007), although not always they are able to pay a premium for organic produced food. Education is also a relevant factor to explain differences in consumers' willingness to pay after the sensory test. Higher educated people are willing to pay a higher premium for organic apples in relation to the conventional counterpart. This result is also consistent with previous literature which revealed that higher educated people tended to show more positive attitudes towards organic food, to seek information on production methods and processes, and to pay a higher premium for organic food (Magnusson et al., 2003; Hill and Lyncchehauon, 2002; Lockie, et al., 2004; Padel, 2005). With regard to gender, no significant differences have been observed between men

and women, contrary from previous literature which has shown that women have a higher predisposition to buy organic food (Wandel and Bugge, 1997) as they seem to be more concerned about the health and welfare of their family, especially of young children (Magnusson et al. 2003; Tsakiridou et al., 2007; Lea and Worsley, 2005; Lockie et al., 2004).

In relation to the second model which analyses the changes in consumers' WTP for organic vs. integrated apples, results are, to some extent similar in relation to those just mentioned, although some differences can be observed. First, sensory cues (taste and external appearance) are not relevant in this case. This result is consistent with the output of the preference map which showed that consumers identify these two apples to have common sensory parameters. The relevance of the variables subjective norms and age is similar than in the first model. Furthermore, the variable availability is significant and negative which means that people that would buy organic food if it was available in regular stores revealed to be willing to pay less for organic vs. integrated apples after the sensory test. Finally, people that have the perception that organic food is equal to conventional food in terms of vitamins, food security, etc. are more willing to pay for them ex-post in relation to integrated apples.

4.5 Conclusion

Individuals' valuation of sustainable produced food is determined by a wide range of issues such as attitudes, sensory characteristics, socio-demographic profiles, information available, etc. This study has intended to analyze the influence of these factors on Spanish consumers WTP for organic and integrated apples. To tackle with this issue, this paper has combined an experimental auction with a sensory test. In fact, two auctions have been performed: before and after the sensory experiment to analyze consumer behavior differences between pre-purchasing and post-purchasing.

Results indicate that Spanish consumers' general attitude towards organic production seems to be positive in response to environmental concerns, health concerns and trust on organic certification and market agents. In addition, Spanish respondents have revealed that they are willing to pay a premium to consume organic produced fresh food, although like better

integrated and organic apples for the blind sensory test. However, this premium is lower than the current price for this product in the Spanish market. Indeed, almost all consumers revealed to be willing to buy organic products if their prices decrease.

In the pre-purchasing situation, the role of "search" information is the most important factor defining consumers' food choice towards sustainable produced food. Participants revealed to be willing to pay a premium for apples produced under environmentally friendly production systems either before or after the sensory "experience" is provided. However, we have shown a decrease in consumers WTP for organic and integrated apples after the sensory analysis indicating that both "search" and sensory "experience" information do have an impact on defining consumers purchase behavior towards sustainable produced food. These results are consistent with Fotopoulos and Krystallis (2002), who identified that consumers buy organic food because they perceived it as healthier food, nutritious, safer ("search" information) and tasty (sensory information) over the conventional counterpart.

In relation to the sensory analysis, results indicate that the sample can be segregated in two groups. The first one prefers the sensorial attributes such as mealiness and sweetness (associated to sustainable produced apples) while a second group prefers attributes such as juiciness, crispiness sourness and firmness (associated to conventional apples). Considering this segregation two regression models were defined in order to identify factors affecting consumers' differences in their WTP for organic apples before (ex-ante) and after (ex-post) the sensory test. Results show that the sensory experience (appearance) does have an important role in defining respondents WTP for organic vs. conventional apples but it is not the case when comparing organic vs. integrated apples. This is consistent with the results of the preference map and supporting the importance of "sensory" experience information on defining individuals' food choices. A further step in this study will be to test the hypothesis made by Fillion and Arazi (2002) and Hill and Lyncchehauon (2002), who stated that beliefs that organic food is tastier generate a positive disposition that will influence consumer perceptions and WTP. This study also highlights the relevance of social pressure and some socio-demographic variables such as age and education on forming individuals' sustainable food decisions.

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CHAPTER 5

Conclusions

5.1 Conclusions

Intangible value and significance of food is normally assessed by experts. In fact, consumers might not generally update their own information and behave along the lines of expert assessments. However, consumer's decision-making process is also determined by cognitive and other environment factors. Indeed, food choice process is a complex phenomenon to analyze, since it constitutes a significant part of individuals everyday life. Consumers choose repeatedly among different food product alternatives, drawing upon a variety of criteria that includes product attributes, such as safety, sensory elements, etc. This is especially relevant when analyzing alternative technologies or production systems and the case of organic food is a clear example. What are the main findings regarding patterns of consumers attitudes and decision regarding organic foods? Are consumers' intentions driven by the confidence on dealers and retailers, risk perception and knowledge when assessing the value of organic foods? Are consumers influenced by the sensory characteristics in building consumers' willingness to pay?

With the aim to shed some light into these questions, this thesis has attempt to provide a conceptual and experimental examination of the formation of consumers' intentions, attitudes and choices towards sustainable produced foods, particularly organic food. This research has attempted to contribute to current knowledge regarding the formation of attitudes and intentions towards organic food, trying to understand the decision making process towards this type of products considering sensory, social, environmental, cognitive as well as economic factors. The main contribution of this thesis has been to point out a set of features that determine choices and purchase intentions of organic food for the particular case of Spain.

Our work is innovative in that: 1) it contains an innovative literature review; 2) it compares a non-adjusted conjoint valuation experiment and an incentive compatible calibrate experiment using the Calibrated Auction – Conjoint Valuation Method proposed by Norwood and Lusk (2011) in order to value respondents response consistence and the relevance of prince when valuing sustainable produced food; 3) it analyzed the influence of elements such as attitudes, sensory evaluation, socio-demographic characteristics, knowledge, etc., on Spanish consumers WTP for organic and integrated apples; 4) unlike most of behavioral analysis it exploits, using structural equation modeling, several theoretical structures that explains Spanish consumers' attitudes and purchase intentions

towards organic food, particularly how risk perception and trust in market agents and institutions explains attitudes towards organic food.

The sequence and findings of the thesis can be divided in three groups according to the methodology used: structural equation models (SEM), Calibrated Auction – Conjoint Valuation Method CACM and the Sensory and auction tests experiment. Results allowed us to respond to the nine research questions presented in the introduction chapter. First, and foremost, the literature review undertaken in this study regarding public intentions towards organic food has led us to conclude that attitudes and intentions towards organic food are influenced trough a series of variables (subjective norms, price, knowledge, environmental concern, etc.) which are interrelated among them in a complex decision process which only has been partially explained in the literature.

In the specification of a conceptual model to explain the consumers' decision making process towards organic food, we have tried to place all the relevant variables identified in previous studies. We have grounded our analysis in the theory of Planned Behaviour (TPB), moving a step forward with the introduction of additional constructs such as knowledge, environmental concerns or trust in agents and institutions. From the analysis we can conclude that for the case of Spain, the consumers' behavioral intention towards organic food relies mainly on the price of the product as well as on social pressure or social opinion. Furthermore, and in contrast with previous literature, consumers' attitudes towards organic food do not significant influence consumers' behavioral intention regarding organic food. However, the results of this thesis show a clear and significant relation between attitudes towards organic food and individual environmental consciousness, trust in organic market agents and institutions and the risk perception associated to conventional food production. Finally, it can also be highlighted the relevance of consumers subjective knowledge on organic food production practices on the perception of risks associated to conventional food production and the level of trust in organic market agents and institutions.

The second step of the analysis, chapter 3, has focused on the analysis of consumers' economic valuation of organic farming compared with another alternative of sustainable agriculture: integrated production. It focuses on the relevance of pricing information in dealing with sustainable food preferences.

The methodological approach has been based on a combination of an hypothetical method (conjoint analysis) with a non-hypothetical (experimental auctions); the so called Calibrated Auction Conjoint Valuation Method (CACM). The apple market has been taken as a case study. Results show that people's valuations of apples are affected by the production system and that Spanish respondents place a higher value on organic products in comparison to the other sustainable alternative and to conventional production systems. Furthermore, among a set of attributes associated with a production system (e.g., price; environmental impact; the use of fertilizers, pesticides and herbicides; plant material; post-harvest treatments; and certification), price had the highest relative importance, followed by the environmental impact of the production system. From a methodological point of view, this chapter also has aimed at comparing results obtained from hypothetical and non-hypothetical valuation methods. In this context, our study also suggests that there are some factors that can explain why participants bid in a different way in non-adjusted versus non-hypothetical calibrated settings. Interestingly, inconsistencies have been found in relation to gender, respondents' knowledge about organic production and practices, risk perception, the importance given to prices when shopping and health concerns. These factors have been also detected in the second chapter to significantly influence consumers both attitudes (knowledge, risk perception from conventional food production practices and health concerns) and intentions to purchase organic food (price).

Finally, chapter 4 has focused on the potential effect of information and sensory issues on purchase behavior in relation to organic food. It uses experimental auctions together with a sensory test to analyze consumer behavior differences between pre-purchasing and post-purchasing occasions. Results indicate that Spanish consumers have a relatively good knowledge towards organic production methods and, on average, they reveal to be willingness to pay a premium for the consumption of sustainable produced fresh food.

However, the premium they are willing to pay for these products is lower than the current market price. In fact, almost all consumers have revealed to be willing to buy organic products if its price decreased. Another conclusion that arises from the bids is that we can highlight the role of "search" information as an important element on defining consumers' food choice towards sustainable produced food since participants were willing to pay a premium for apples produced under environmentally friendly production systems either before or after the sensory "experience" is provided. This positive attitude towards organic production is related to environmental concerns, health concerns and trust on organic

certification and market agents, consistent with results from chapters 2 and 3. Regarding to the sensory analysis, it has been found that the sample can be segregated into two groups: one preferring sensorial attributes such as mealiness and sweetness (associated to sustainable produced apples), while the second more oriented towards attributes such as juiciness, crispiness sourness and firmness (associated to conventional apples). Indeed, the sensory experience (appearance and taste) does have an important role in defining respondents WTP for organic and integrated apples, even thought information about sustainable production seems to play a most relevant role. Consequently, we can conclude that the sensory elements such as appearance and flavor, together with price concern, risk perception and environmental behavior are significantly related with the willingness to pay a premium for organic and integrated apples in comparison to conventional ones.

Apart from the methodological contributions of this thesis mentioned in each Chapter, we think that the empirical results obtained could shed light about future marketing strategies in the organic food sector. It seems necessary to strategically modify the orientation of marketing campaigns in three directions: 1) a more active participation of the private sector (up to know most of the promotion efforts have been addressed from the public sector). In this context, it could be useful the introduction of educational programs at schools' agenda with the objective of creating future consumption habits; 2) to highlight the real competitive advantage of organic farming as a production systems (the mentioned perceived benefits from the consumers' point of view) instead of focussing on organoleptic characteristics; and 3) to develop a more efficient cost (price) strategy to make organic farming affordable to a broader audience who is willing to pay a premium.

Obviously, this thesis is only one step more in the research on consumer behavior of organic farming. Although the CACM has been proved a flexible enough method to elicit consumers' WTP, further research should be done to test the validity of such an approach. For instance, it would be useful in the future comparing results when participants bid for the organic alternative instead of for the conventional product as it has been done in this study.

Second, further analysis could be done to compare results from CACM from those obtained in other hypothetical and non-hypothetical valuation methods. The literature on this area applied to food products is at its earlier stages. From an empirical point of view, the research interest could be focused on comparing results with other fresh and processed products in order to test if results in this study are case specific or could be generalized.

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APPENDIX

SURVEY

Good morning/afternoon. We are a center of economy and food development research. We are conducting an investigation in Spain about the habits and consumer behavior regards organic food. We guarantee the complete anonymity in your responses. It will take only a few minutes answering the survey. Could you help us? We appreciate your participation.

Buy behavior

1. Are you in charge to buy the purchase in your home?
   - Yes, I have the exclusive responsibility.
   - I share the responsibility with my partner.
   - No, (Finish the survey)

2. Do you buy apples or apple juice?

Frequency	Apple (quantity)	Apple Juice (quantity)
One per week		
One per month		
Others		
Never(Finish the survey if you choose never in the two products)		

3. Could you tell me the price you paid the last time for a liter of apple juice? Price: …… €

4. Could you tell me the price you paid the last time for a kilo of apples? Price: …… €

5. Do you consume organic food?

Usually ___ Go to question 5
Occasionally __ Go to question 5
Never ___ Go to question 11

6. What kind of establishment you buy organic food?

__ Super Markets

__ Specialty Stores Markets

__ Go directly to the producer

__ Others

7. Could you tell us the weekly or monthly expense of your family, including you, in organic food?

Weekly ……..€
Monthly ……..€

8. Do you buy organic apples? Yes __ No__ Go to question 10

9. Please, indicate on a scale from 0 to 3 as you assess the characteristics of organic apples

Appearance	3 2 1 0 1 2 3 Organic Conventional
Variety	3 2 1 0 1 2 3 Organic Conventional
Size	3 2 1 0 1 2 3 Organic Conventional
Aroma	3 2 1 0 1 2 3 Organic Conventional
Price	Organic Conventional
Flavor	3 2 1 0 1 2 3 Organic Conventional
Freshness	3 2 1 0 1 2 3 Organic Conventional

10. Do you buy organic apple juice? Yes __ No__ Go to question 12

`

11. Please, indicate on a scale from 0 to 3 as you assess the characteristics of organic Apple juice

Appearence	3 2 1 0 1 2 3 Organic Conventional
Variety	3 2 1 0 1 2 3 Organic Conventional
Brand	3 2 1 0 1 2 3 Organic Conventional
Aroma	3 2 1 0 1 2 3 Organic Conventional
Price	3 2 1 0 1 2 3 Organic Conventional
Flavor	3 2 1 0 1 2 3 Organic Conventional
Freshness	3 2 1 0 1 2 3 Organic Conventional

Purchase Intention (Ajzen, 2006; Magistris and Gracia, 2008; Lookie et al. 2004)

Indicate in a scale of -3 to 3 to what extend do you agree with the following statements on issues relating to organic products (-3 refers to strong disagreement and 3 refers to strongly agree):

12. I planned to buy organic food in the coming days

-3 -2 -1 0 1 2 3

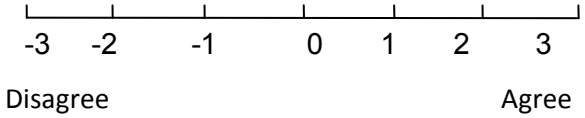
Disagree Agree

13. I buy organic food if I found in the establishments where I buy regularly

-3 -2 -1 0 1 2 3

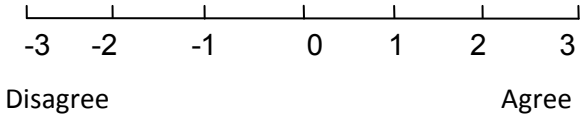
Disagree Agree

14. I intend to buy organic food by lowering their price.

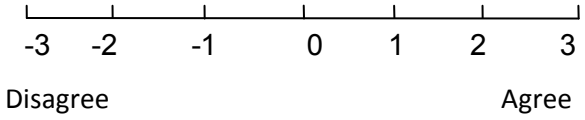


Subjective Norms (Ajzen, 2006)

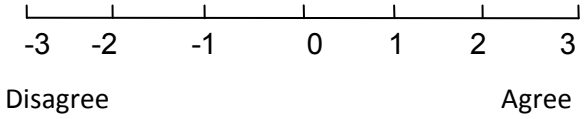
15. People who are important to me believes that I should buy organic food.



16. My circle of friends advise me to buy organic food

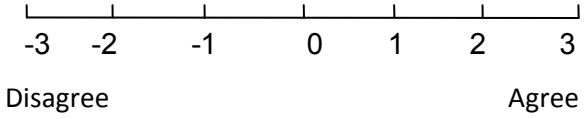


17. My family thinks we should include in our food supply organic products

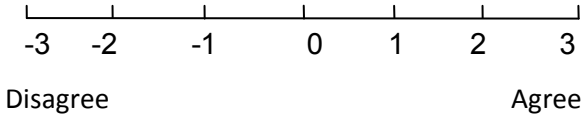


Perceived Control (Ajzen, 2006)

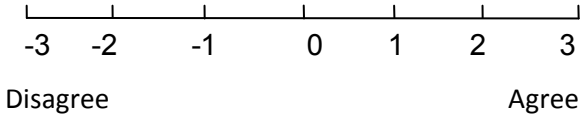
18. I find organic food in the establishments where I usually buy



19. Mostly depends on me or not to buy organic food

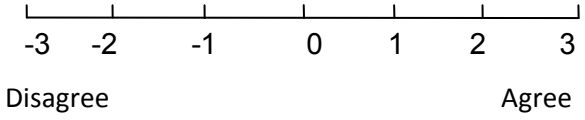


20. There are not many varieties of organic foods on the market

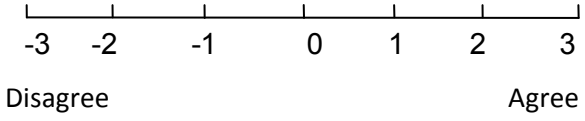


Price Importance (Botonaki, 2006)

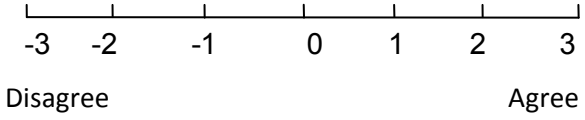
21. The price of a product is very important to me.



22. Always I compare the prices of products in a purchase

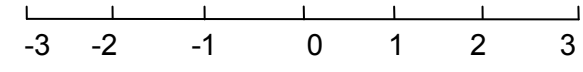


23. Always I pay attention to the lower prices when I buy the food

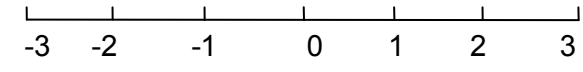


Health Concern (Botonaki, 2006; Magistris and Gracia, 2008)

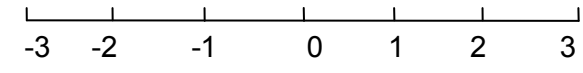
24. For me it is important that the food I eat is usually rich in vitamins and proteins



25. For me it is important that the food I eat is low in fat consumption.

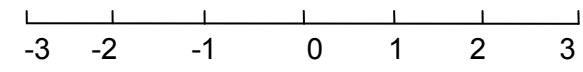


26. I avoid eating pre cooked meals

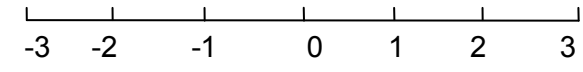


Environmental Attitudes (Magistris and Gracia, 2008)

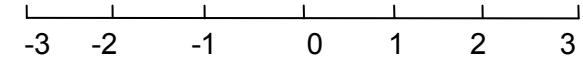
27. The current process of development are destroying the environmental irreversible.



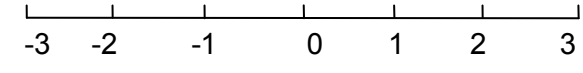
28. It is important to me that the foods I eat are packaged with recyclable material



29. For me is important to separate the garbage

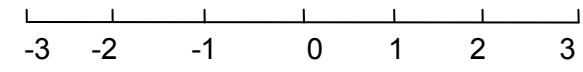


30. For me is important that the foods are produced in within a system that respects the environment.

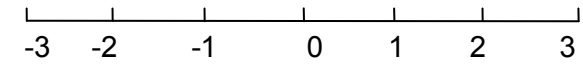


Attitudes toward organic food

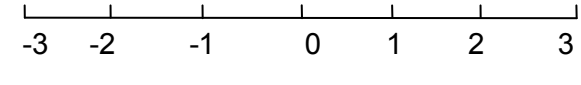
31. Organic food has fewer chemicals than conventional foods.



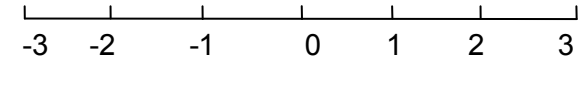
32. Organic foods doesn't have more vitamins than conventional foods



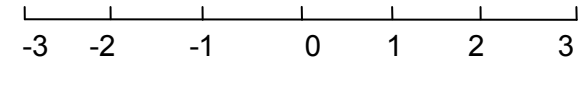
33. Organic foods are safer than the conventional foods



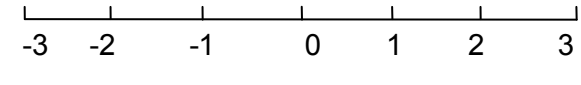
34. Organic foods are healthier than the conventional foods



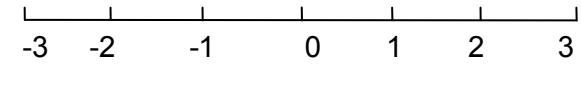
35. Organic foods are better than the conventional ones



36. Organic foods have better appearance than the conventional ones

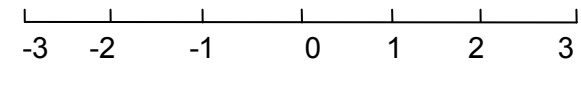


37. Organic foods are more perishable

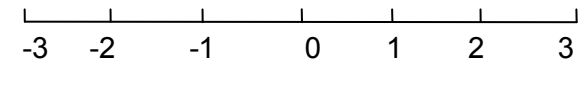


Confidence (adapted Chen and Li, 2007)

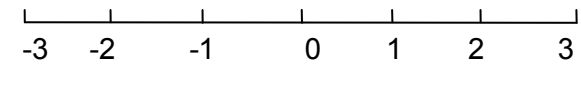
38. I trust on organic food producers



39. I trust on organic food distributors

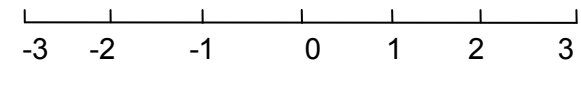


40. I trust in the veracity of the labeling of organic food certification

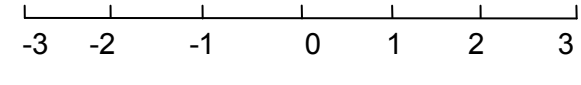


Risk (Lookie et el. 2004)

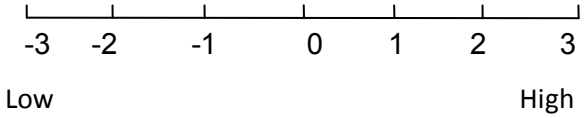
41. Could you indicate me what level of risk involved to your health consume regularly processed foods grown with pesticides and other chemicals



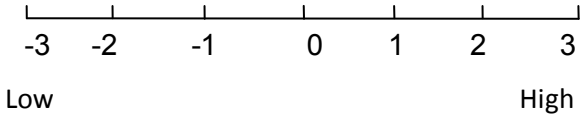
42. Could you indicate me the level of risk involved for people who regularly consume GM foods



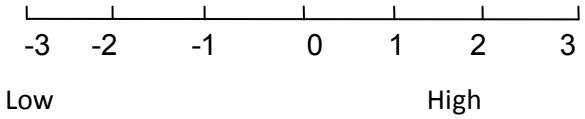
43. Could you tell me the level of risk involves to your health consume regularly irradiated food



44. Could you tell me the level of risk involves to your health consume foods with preservatives and colorings regularly

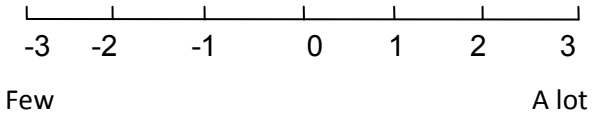


45. Could you tell me the level of risk involves to your health consume foods animal origin foods which have been treated with hormones and antibiotics

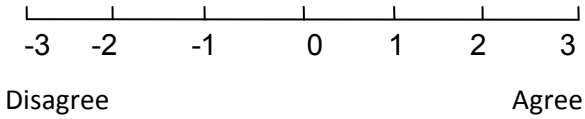


Subjective Knowledge

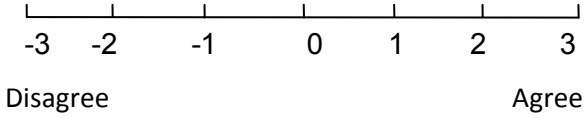
46. How do you considered inform about organic foods



47. I think that is necessary more information about organic food



48. Within my circle of friends I consider myself as an expert in organic foods



Objective Knowledge

49. Organic products have a certification that distinguishes them from others foods ___True ___False

50. Organic foods have specific regulations ___ True ___False

51. Organic foods production uses traditional methods ___True ___False

Aspectos socio-demográficos

52. Gender: Woman Man

53. Age:
__18-34
__35-49
__50-64
__More than 65

54. Education Level:
__Unfinished primary school
__ Finished primary school
__Unfinished secondary school
__ Finished secondary school
__University degree
__Graduate studies

55. Labor situation
__Employee
__ Own business
__ Retired
__Unemployed
__ Other

56. Month income
__1000 euros or less
__1001-1500 euros
__1501-2000euros
__2001-3000euros
__ 3001 euros or more

57. Civil status
__ Bachelor
__Married
__ Live with partner
__ Other

58. Children at home
__ Yes, go to question 59
__ No, Thanks for answer the survey

59. Age of your children
__ Less than a year
__1-5 years
__5 -12 years
__12 -16 years
__ More than 16 years