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Additional Information

Importance of the origin, organic production and other extrinsic parameters in fruit and vegetable choices

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Abstract

The aims of the present work were to evaluate consumers' perceptions and purchasing habits in relation to fruit and vegetables and to determine the importance of the production type, price and geographical origin of such products for consumers' purchasing decisions. For this purpose, an online consumer survey was conducted to determine Spanish people's opinions and consumption habits in relation to fruit and vegetables, especially those from organic farming. The survey also included a part to assess the importance that consumers attach to different extrinsic attributes in oranges and avocado pears (with a conjoint analysis), and a section to determine the participants' ethnocentrism. Consumers agree that organic food respects the environment more, contains fewer "chemicals" and is more natural. Price is the first reason why many people do not buy organic food, followed by them thinking that they do not offer any added value and they are difficult to find. For the Spanish population, country of origin, local production, seasonality and price are much more important attributes for purchasing fruit and vegetables than them being organic. This study reflects a relatively high ethnocentrism level of the surveyed population, especially in older individuals. Given consumer preference for km 0/local and seasonal products, and the importance of these parameters for the environment, promoting the market of such products would help to achieve some Sustainable Development Goals. This study offers a vision of the trends of Spanish consumers in relation to fruit and vegetable preferences, which can help producers and distributors to design new strategies that focus on meeting consumer demands.

Keywords

Produce, ecological, country of origin, consumer perception, ethnocentrism

INTRODUCTION

In the last few decades, consumers have voiced permanent concern about protecting the environment. Food consumption is a major sustainability issue due to its impact on individual and public health, natural resources, social cohesion and the economy (Cooreman-Algoed et al., 2022; Thøgersen et al., 2017). Indeed consumers are becoming increasingly aware of the importance of their purchase decisions, and intentionally opt for food products that have minimal to no negative impact on humans, animals and the environment.

Several studies have focused on organic and local food as a more sustainable alternatives because they are considered environmentally friendly and supportive of the local economy (De Boer et al., 2007). Consumers of organic food also associate them with attributes like better taste, animal welfare impacts, climate and environmental effects (Ditlevsen et al., 2020; Jensen et al., 2019). However, how they perceive local products depends on many factors due to the heterogeneity of consumers' understanding and definition of local foods. Some consumers associate local products with attributes like taste, freshness, trust or local jobs (Ditlevsen et al., 2020). Different studies have found some overlap between consumers who prefer local food and those who prefer organic food (Costanigro et al., 2014; Ditlevsen et al., 2020; Gracia et al., 2014; Hempel and Hamm, 2016; Jensen et al., 2019). However, Not all the consumers who tend to choose locally produced food are also likely to prefer organic food (Ditlevsen et al., 2020), which indicates that local organic food could be both competitive and complementary. Consumer preferences for local products also underline clear local identity and culture elements (Galli and Brunori, 2013). In fact in regions with a marked local identity and strong commitment, consumer demands for local products is likely to be higher (Fernández-Ferrín et al., 2018). Not only is food produced nearby important to some

consumers, but country of origin is also a major issue in purchase choices. Consumer preference to buy locally (in their area or country) made products over a foreign product is known as consumer ethnocentrism (Boca, 2021). Different studies have evaluated the effect of consumer ethnocentrism on consumers' attitudes and purchase intentions towards foreign products on the market (Bryla, 2019; Durço et al., 2021; Fernández-Ferrín et al., 2018). Consumer ethnocentrism strongly influences consumer attitudes by leading them to negatively evaluate foreign products (Boca, 2021). However, the importance of origin for purchasing habits is usually doubtful. Different studies have proved that, although origin influences consumer product evaluations, it does not necessarily determine final purchasing behaviour because purchasing likelihood is affected by other predictors of behaviour, such as price sensitivity (Krystallis and Chryssochoidis, 2009).

All these factors (organic production, local production, country of origin) are credence attributes that currently play an important role in food marketing (Fernqvist and Ekelund, 2014). Other credence attributes that affect eating habits are “healthy” and “natural” parameters, and fruit and vegetables are products that consumers associate with both parameters (Brückner, 2022; Lombart et al., 2019; Mesías et al., 2021). Nevertheless, the use of chemicals during production and storage is an aspect that causes consumer concern. For these reasons, some people seek organic, local or proximity products, but for others, their higher price or the fact that their appearance is imperfect or more heterogeneous, and the consumer distrust contribute to they do not choose this production type.

Spain is the leading producer of fruit and vegetable in the European Union (EU), and the fifth in the world (MAPA, 2022). This sector represents a very high source of income for Spain's economy. However with market globalisation, competitiveness is high and

producers have to adapt their products and way of marketing to consumer demands. Hence for the agri-food sector, it is important to know the current drivers that affect purchase choices of fruit and vegetables.

The analysis of consumer preferences and behaviour should be performed in a country's geographical and economic-social context because its level of development and culture strongly influence food consumption models (Radulescu et al., 2021). No recent studies dealing with the importance attached by Spanish consumers to different extrinsic parameters, such as origin, organic production, among others, in fruit and vegetable choices were found. Molinillo et al. (2020) studied the drivers of organic food purchasing, but only of Spanish millennials. Pérez-Flores et al. (2020) reported a comparative analysis of consumers of organic fruit and vegetables in Spain and Portugal, but the data used in their study were from 2010. Rodríguez-Bermúdez et al. (2020) characterised consumers of organic food, but their study was limited to Galicia (Northern Spain).

The aims of this work were to evaluate consumers' perceptions and purchasing habits in relation to these products and to determine the importance of the farming type, price and geographical origin of such products for consumers' purchasing decisions.

MATERIALS AND METHODS

Consumer survey

An online survey was conducted between April and May 2020 in Spain via the Google Form platform to determine Spaniards' opinions and consumption habits in relation to fruit and vegetables, especially those from organic farming and local production. The survey also included a part to assess the importance that consumers attached to these products' different extrinsic attributes (with a conjoint analysis), and a section to determine the participants' ethnocentrism.

The European General Data Protection Regulation research ethic guidelines were followed in this study. Before the study began, consumers were informed about: being able to participate in an anonymous survey about fruit and vegetables carried at the Universitat Politècnica de València and the purpose of the study; having to choose if they voluntarily accepted to participate in that study or if they did not wish to participate in the study.

The respondents were recruited through social networks and through word-of-mouth. With a sample size of 364 valid cases and by assuming a confidence level of 95%, the sampling error of the present study was 5.1%.

The questionnaire was divided into five parts.

Part 1. Socio-demographic data: the participants were asked for personal data (age, gender, level of education, monthly incomes and the province they lived in).

Part 2. Conjoint analysis: in this questionnaire part, two different fruit were used as the target products: one of them was oranges, with a long-standing production and consumption tradition in Spain, and can be considered a local traditional product. The other was avocado pears, which is not a traditional fruit in Spain, but its production and consumption rates are rising. Three attributes were evaluated: price, origin and farming type, with three levels, except for the last one which had two levels (Table 1). Origin and farming type were selected because they were the target attributes in this study. Price was chosen for being one of the main parameters that influences product choice (Jiménez-Guerrero et al., 2012; Speight et al., 2019), in addition to being a factor widely used in this type of analysis (Gaspar et al., 2022). These parameters were also selected in a study on apples in Germany for being usually those illustrated on packages in supermarkets (Meyerding and Merz, 2018). The selection of the different prices was based on regular prices on the Spanish market. For oranges, origin Morocco was selected for being one of

Spain's main competitors of fruit and vegetables producers, plus any country in Europe to compare if, should the product not come from Spain, consumers had different preferences according to origin. For avocado pears, South America was selected for being large avocado pear producers.

The D-optimal design provided by XLSTAT (Long Island, NY, USA) (Addinsoft, 2020) was used to generate the profiles. The incomplete block design was employed to generate the comparisons to be presented. Three prohibited combinations were established for being less likely to be found: high price-Morocco-conventional, low price-Spain-organic and low price-Europe-organic in oranges; high price-Morocco-conventional, low price-Spain-organic and low price-South America-organic in avocado pears. Two different designs were included (8 profiles in design 1 and 8 profiles in design 2). Design 1 was used for the survey held with half the participants and design 2 with the other half. In each design, two choice sets (one for oranges and another for avocado pears) composed of four lots of three labels per product were generated. Supplementary Figure S1 is an example of the instructions given to consumers and of one of the four lots of three oranges and avocado pears. Data were analysed by the hierarchical Bayes procedure to estimate part worth utilities and the importance of attributes.

Part 3. Consumption and purchasing habits: the participants answered questions about their purchasing and consumption habits in relation to fruit and vegetables in general, and to organic farming and local production in particular.

Part 4. Importance of intrinsic and extrinsic attributes: the consumers indicated their degree of agreement with the statements about the importance of appearance, price, country of origin, km 0/local products, seasonal products or organic food when purchasing fruit and vegetables. For this purpose, 7-point Likert scales were used, where 1 corresponded to "totally disagree" and 7 to "totally agree".

Part 5. Ethnocentrism: the ethnocentrism level was analysed with a questionnaire that included 10 statements. It is based on the CETSCALE developed by Shimp and Sharma (1987) and adapted by Luque-Martinez et al. (2000), as in other recent studies (Casado-Aranda et al., 2020; Maksan et al., 2019; Miguel et al., 2023) (the statements of this survey part are shown in Table 2). As mentioned above, 7-point Likert scales were used.

Data analyses

A Chi-square analysis was performed to test if there were differences in gender, age, level of education or incomes in relation to consumption and purchasing habits.

Cronbach's alpha was used to determine the reliability of the ethnocentrism scale. A hierarchical cluster analysis was carried out with the answers about the importance of intrinsic and extrinsic attributes (questionnaire part 4), and also with the data from the ethnocentrism survey (questionnaire part 5), to check if there were groups of consumers with different opinions. Euclidean distances and Ward's aggregation method to categorise similar respondents into groups were used in line with other studies (Speight et al., 2019). Next an analysis of variance (ANOVA) was performed for each survey question in questionnaire parts 4 and 5, and also for the utilities calculated in the conjoint analysis (questionnaire part 2) (dependent variables) to check if the differences in responses among clusters were significant. The HSD (Honestly Significant Differences) of the Tukey test was used to test for differences at the 5% significance level.

A Chi-square analysis was performed to test if there were differences in the gender, age, level of education or incomes among clusters.

The employed statistical programme was XLSTAT (Addinsoft, 2020).

RESULTS AND DISCUSSION

Participants' socio-demographic data

In this study, 364 consumers participated and most were women (Table 3). Their ages fell within the 18-78 years range, with 42.6% within the 30-49 year range. The majority of the participants had a bachelor's degree and 42.0% indicated incomes of 1,500-3,000 €/month.

Consumption and purchasing habits of fruit and vegetables

The results of this part of the study demonstrated that the majority of the respondents (81%) ate fruit and vegetables every day and they used more than one distribution channel. Supermarket was the most frequent purchasing place (chosen by 73% of the participants and accounting for 41% of total mentions), followed by greengrocers and markets (Figure 1(a)), which agrees with other studies (Rodríguez-Bermúdez et al., 2020). Almost 10% of the participants stated buying fruit and vegetables directly from producers, 5% did so in organic food stores, and < 1% bought such products online. Although the e-commerce for the food and beverage industry has grown in Spain (DARetail, 2021), these data reflect that online purchases of fruit and vegetables still represent a very small part of all sales.

The survey included a question about frequency of purchasing and consuming organic fruit or vegetables. Of all the respondents, 30% stated consuming these products at least once a week, 16% once a month, 27% only consumed them occasionally and 27% practically never did. Pérez-Flores et al. (2020) reported that in 2010, 5.9% of the population always consumed organic fruit and vegetables, and 36.8% consumed them often and sometimes. A study on the perception and consumption of organic food carried out in 2015 by the Department of Agriculture, Livestock, Fisheries and Food of the

Catalan Generalitat (Generalitat de Catalunya, 2015) established that approximately 26% of the respondents ate organic foods at least once a week, and 12% did so at least once a month. These data reveal that the consumption of these products has slightly increased in recent years.

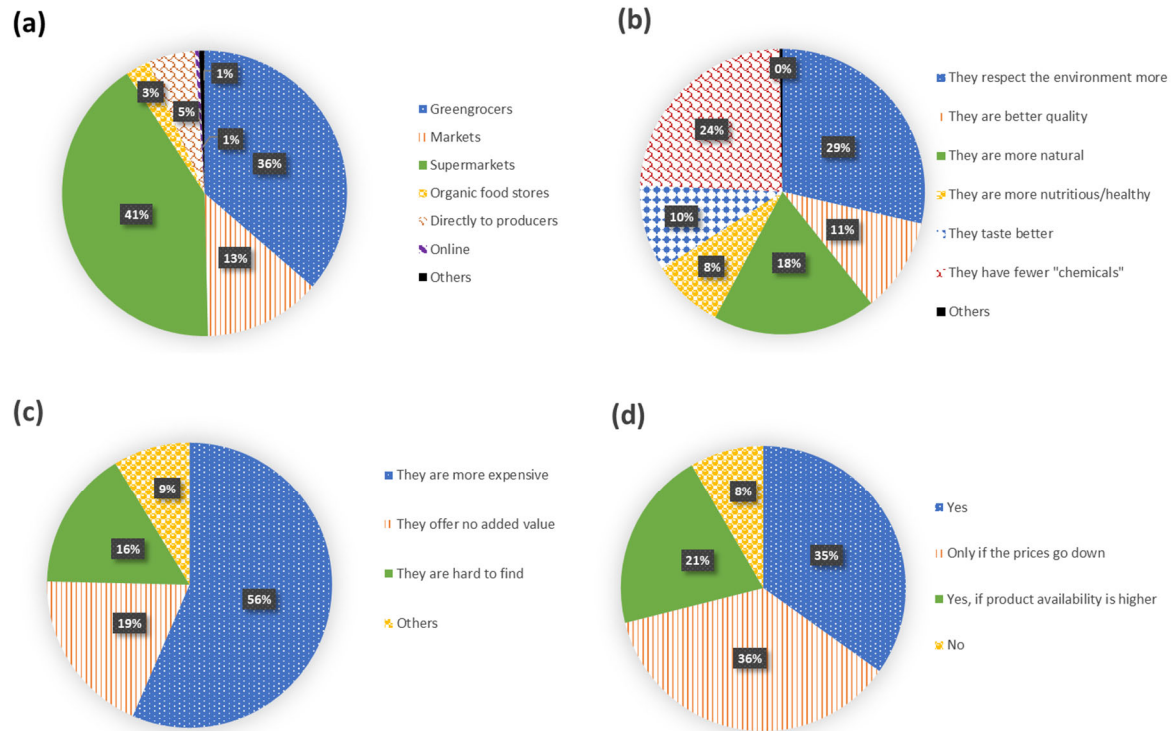


Figure 1. (a) Distribution of points of sale of fruit and vegetables; (b) reasons why consumers buy organic fruit and vegetables; (c) reasons why consumers do not buy organic fruit and vegetables; (d) responses about the intention to increase consuming organic food.

The Chi-squared analysis showed significant differences in the frequency of consuming fruit and vegetables, and organic fruit and vegetables, according to level of education. The respondents with a higher level of education showed the highest percentage for frequency of consumption of both food types, while the participants with the lowest level were those with the highest percentage of people who never consume

organic fruit and vegetables. These results fall in line with the study of Rodríguez-Bermúdez et al. (2020), who reported that consumers with higher levels of education buy more organic food. Gender or income did not significantly affect consumption and purchasing habits, which agrees with the results obtained in Spain by Pérez-Flores et al. (2020).

The participants who bought organic food stated that the first reason for doing so was because “They respect the environment more” (chosen by the 68% of the participants, and representing 29% of all mentions), followed by “They have fewer chemicals” and “They are more natural” (Figure 1(b)). To a lesser extent, consumers also chose ecological products because they considered them to be better quality, have more flavour and for being more nutritious and healthier. Other studies in different countries evidence that consumers have different orientations to choose organic food products. According to them, some consumers seek environmental issues and others indicate personal benefits, such as health and taste, among others (Feil et al., 2020). The most important reasons are generally related to health and environmental protection, especially in developed countries (Bryla, 2018; Janssen, 2018; Truong et al., 2021). Rodríguez-Bermúdez et al. (2020) showed that Galician consumers placed more emphasis on health aspects and quality, followed by fewer chemicals and environmental care.

For consumers who do not usually buy organic fruit or vegetables, their high price was the main reason for practically never consuming this product type (Figure 1(c)). Also a significant percentage of participants stated that “They do not provide any added value” and “They are difficult to find”, despite a market study carried out in parallel to this work (data not shown) determined that there is currently a considerable supply of this product type. In “Others”, the main reasons that appeared were lack of information about organic food and many people considering such products to be “a swindle”. Other studies have

shown that price is one of the major barriers for buying organic food, together with little availability, lack of consumer knowledge and scepticism (Bryla, 2018; MAPA, 2017; Rodríguez-Bermúdez et al., 2020; Xie et al., 2015), which agree with the results herein obtained.

Importance of different factors when purchasing fruit and vegetables

On the importance of appearance, price, country of origin, whether it is km 0/local and if it is seasonal or ecological, when purchasing fruit and vegetables, the “country of origin” and “km 0/local” and “seasonal” parameters obtained the highest mean values (Figure 2(a)). Although price and appearance were also considered important attributes, they obtained lower scores. It is noteworthy that “organic” was the attribute with the lowest value (mean score of 4). These results fall in line with those of a study on fruit and vegetable purchasing decisions carried out in Italy by Massaglia et al. (2019), who observed that “origin”, “seasonality” and “freshness” were the most important attributes that consumers considered for purchases, while “organic certification” was not important for them. In Spain, a study of the Ministerio de Agricultura Pesca y Alimentación (MAPA, 2017) reported that many buyers of organic food (66%) especially valued labels with detailed information about their origin and cultivation/production, which reveals that the origin of products has been a consumer concern for years.

After taking all these results into account (importance of local products, supply of fruit and vegetables with logos or indications of local or proximity products in hypermarkets and supermarkets being scarce), distributors should increase the supply of these products and highlight this information at points of sale because it could improve the image and, therefore, the purchase volume of these fruit and vegetables.

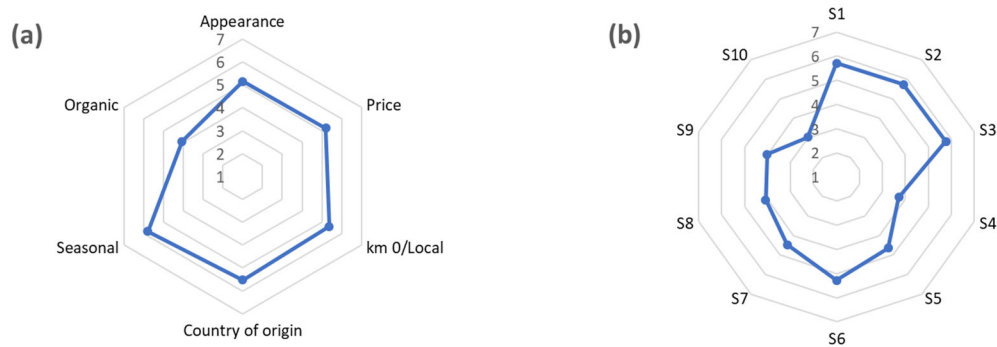


Figure 2. Mean scores (7 point-scale) given by consumers (a) for the importance of different parameters when purchasing fruit and vegetables and (b) for the ethnocentrism survey sentences (the meaning of the codes of the 10 items (S1-S10) is given in Table 2).

Finally, the participants were asked if they would like to buy more organic food in the near future. The highest percentage (37%) answered “Yes”, 35% answered “Only if prices go down” (Figure 1(d)), followed by “Yes, if there is more product availability” and the least selected option was “No”, which was chosen mostly by the respondents who answered that they practically never bought or consumed organic food. These results agree with a study carried out in 2017, in which most participants wanted to buy more organic food (MAPA, 2017). The Chi-squared analysis showed significant differences in intention to increase consuming organic food depending on age, with the highest percentage of people stating that they intended to consume more organic food in the youngest group (18-29 years of age), and the older groups (50-65 and >65) were those who mostly stated that would consume organic food, but only if prices were lower.

Once again, these results reflect that price and perceived lack of availability are two important barriers for buying organic food as stated by several authors (Bryla, 2018; Feil et al., 2020; Xie et al., 2015). At the present, organic food unavailability is not real as above mentioned, and distributors should make sales of these products more visible in supermarkets and carry out advertising campaigns.

Ethnocentrism results

An ethnocentric survey was conducted to determine consumer opinions about consuming national products. Cronbach's alpha of the scale herein employed was 0.921, which indicates excellent internal reliability. Figure 2(b) shows the mean scores given by the respondents for the different ethnocentrism survey statements. The higher the score for any statement was, the higher the ethnocentrism level.

The statements about which the respondents mostly agreed with a fairly high degree were the first three and in this order: "Buying Spanish-made products keeps Spaniards working", "Only those products that are unavailable in Spain should be imported" and "Spanish people should always buy Spanish-made agri-food products instead of imports", with average scores very close to 6. They were followed by the statement "It is always best to purchase Spanish products" (statement S6) (Figure 2(b)). The mean values for sentences S5 and S7 were lower, but also above 4. However, most of the participants did not agree with the sentences "It is not right to purchase foreign agri-food products" (S4) and "Spanish consumers who purchase products made in other countries are responsible for putting their fellow Spaniards out of work" (S10), with a mean score of 3.7 and 3, respectively. These low scores, which contrast with the others, could be due to sentence S4 being very general and the others (S10) may be too aggressive.

The mean questionnaire score was 4.6. These results confirmed that the participants can be generally considered slightly ethnocentric people. In a study carried out in the Valencian Community in 2007 (Clemente et al., 2011), where ethnocentrism was studied, similar results were obtained, but with slightly lower scores than those found in the present work. The mean value of all the scores in that study was 4.4. This evidences that the ethnocentrism level observed years ago remains, or has even been reinforced.

A cluster analysis was carried out to determine if there were groups among the participants with different opinions about the parameters that influenced purchases and consumption of fruit and vegetables, and with different ethnocentrism levels. Three clusters were identified: cluster 1 = 145 individuals representing 39.8% of the participants; cluster 2 = 195 individuals with 53.6% of the participants; cluster 3 = 24 individuals representing 6.6% of the participants).

Table 3 shows the personal data of the individuals in each cluster, together with the chi-square analysis results. Significant differences appeared in the three groups only for gender and age ($p < 0.05$). Regarding age, cluster 1 was made up of the oldest individuals (50% of the participants aged 50-65 years), while the youngest were mainly grouped in cluster 3 (54.2% of the participants aged 18-29 years), with cluster 2 containing intermediate ages (30-49 years). In the three clusters, a higher percentage of women appeared compared to men, and this difference was more noticeable in cluster 1.

Next an analysis of variance (one-way ANOVA) was carried out to determine if there were any significant differences among the three identified clusters in the survey responses. Table 2 shows the mean values obtained in the opinion surveys on the parameters that influenced purchase and consumption, and also in the ethnocentric survey, for the different identified groups, together with the ANOVA results. Supplementary Figure S2 shows a graph of the parallel coordinates, which includes all the items from both surveys, where the behaviour of each cluster is clearly observed and is explained below.

Opinions on the importance of price and whether or not a product is organic did not vary significantly among clusters, with very few differences found for the appearance parameter. However, a major difference appeared between clusters 1 and 3 when assessing the importance of fruit and vegetables being 0 km/local, country of origin and,

to a lesser extent, if they were seasonal. In all three cases, the assessment of the cluster 1 individuals was significantly greater, which demonstrates more concern about these aspects in the older population. It should be noted that the youngest attached less importance to all the items, except for price, where no significant differences among clusters were observed as mentioned above.

The participants' ethnocentrism was significantly higher in cluster 1 (mean score of 5.9), followed by the values of cluster 2 (mean score of 4.1), and cluster 3 had very low values (< 4) for all the statements (mean score of 2.1; Table 2). These results show that the youngest individuals (cluster 3) can be considered non-ethnocentric people, while the older respondents took quite an ethnocentric attitude. This agrees with the findings of Miguel et al. (2023), who stated that ethnocentric beliefs increase with consumers' age. The cluster 2 individuals took a more neutral position, and also showed a certain ethnocentrism level. We must take into account that cluster 3 only included 24 individuals, which were a minority in this study, and they represented 6.6% of all the respondents.

Conjoint analysis results

In order to determine which factors (price, country of origin or farming type) had the strongest impact when purchasing fruit, a conjoint analysis was carried out on oranges and another on avocado pears by combining three different prices with three different countries of origin and two farming types. In both studies, the relative importance of both factors and individual utilities were calculated.

For oranges, it is observed that the factor with the strongest impact when buying these products was country of origin (importance of 49%), followed by price (36%), and farming type was the least important (16%). This agrees with a study performed in the

Valencian Community in 2007 on oranges. It evaluated origin, flavour, appearance and price, and origin was the parameter to which the most importance was attached (Clemente et al., 2011). However for avocado pears, the most important factor was price (importance of 50%) followed by country of origin (38%) and, as in the previous case, the least influencing purchase decision was whether farming was conventional or organic (13%). There could be two reasons for this difference in the importance of price between both fruit products. Firstly, the price of oranges is much lower than that of avocado pears, which could motivate consumers to better value the origin of oranges because the difference in prices (1.49 €/kg - 3.49 €/kg) was not as high as for avocado pears (3.99 €/kg - 7.99 €/kg). The high price of avocado pears could condition preferences. This falls in line with a study on the sensitivity analysis of prices. It demonstrated that the share of consumer choice preferences fell as price rose (Sigurdsson et al., 2017). Moreover in Spain, the orange production tradition is long-standing, which could have also motivated attaching more importance to the origin of these products compared to avocado pears, which are not products traditionally grown in Spain. Regarding farming type (conventional or organic), this factor obtained considerably less importance values. A study on the importance of the production method, product origin, certification and price of apples in the USA concluded that, for both consumers who do not buy organic products and for those who do, the relative importance of origin and price was greater than the importance of production method or certification (Wang et al., 2010). Similar results were found by Meyerding and Merz (2018) in a study on apples in Germany, with relative importances of 44%, 35% and 21% for price, origin and organic label, respectively. However, in a study carried out on cucumber with German tourists in Spain, which evaluated price, freshness, origin and farming type, the most important factor was

freshness, followed by origin, farming type and, lastly, price (ranging between €1-3) (Jiménez-Guerrero et al., 2012).

Figure 3 shows the mean utilities calculated in the conjoint analysis for oranges and avocado pears. For oranges, positive and very high utility values were obtained for origin Spain, followed by the lowest price, which was 1.49 €/kg. These results were similar to those reported by Meyerding and Merz (2018) in a study in Germany, where the “local” origin (not herein tested), followed by nationally produced apples (with the specification “Germany”) and the lowest price (1.49 €) revealed the highest part-worth utilities. For origin Europe, the utility was also positive, but with a very low value. The same occurred with the intermediate price. What all this means is that consumers would not penalise oranges from Europe, but preferred Spanish oranges. However, for origin Morocco, the mean utility was negative and with a high value (-4.09). This shows that origin Morocco for the respondents would negatively impact the probability of choosing oranges at points of sale. Clemente et al. (2011) also noted a negative impact for origin Morocco on purchasing of oranges in the Valencian Community. Despite the importance and obligation to inform about origin of fruit and vegetable products, in the market study carried out in parallel to this work (data not shown) it was found that this information is not always available at the time of purchases, especially for products sold online.

The highest price (3.49 €/kg) also presented a negative mean utility, but it was less important than that of country of origin. For farming type, organic production presented a positive mean utility and conventional farming obtained a negative value. This determined that organic food would be an incentive for purchasing oranges.

The avocado pear results showed the lowest price, 3.99 €/kg, presented the highest positive mean utility value, while the highest price presented the highest negative mean utility value (Figure 3). This finding indicates that the price would be decisive when

purchasing this product. Origin Spain had a very high positive mean utility and origin Morocco obtained an important negative value, as happens with oranges. Origin South America also presented negative utilities, albeit with a lower importance value than Morocco. This means that the respondents would opt for avocado pears from South America over those from Morocco. The farming type results were similar to those obtained for oranges.

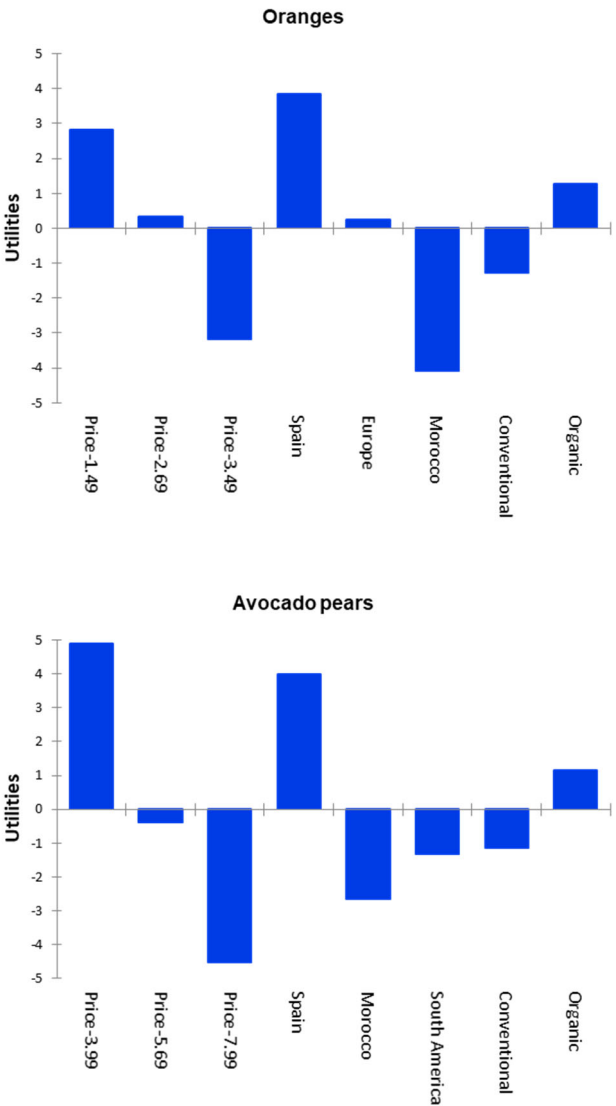


Figure 3. Mean utilities obtained in the conjoint analysis for (a) oranges and (b) avocado pears for each factor.

These results evidence the high level of importance that consumers attach to country of origin, which falls in line with the ethnocentric survey results, where an ethnocentric tendency was observed for most of the participants in the study. Regarding price, the results showed that when price was not very high, it was not the most important factor to influence purchasing a product. However when price is high, as in avocado pears, it can be decisive for purchase decisions.

The individual utilities were grouped according to the previously three obtained clusters to check if individuals' utilities were different in the three clusters identified in the previous section. Table S1 shows the mean utilities obtained for each cluster for both oranges and avocado pears. For oranges, in cluster 3 (the youngest one) the highest positive utility was obtained for the lowest price who, conversely, penalised the high price (the highest negative utility).

Regarding origin, although the utilities of origin Spain in all three clusters were positive and those of origin Morocco were negative, the differences in the utilities among clusters were significant. The mean values of the utilities in cluster 1 (the oldest and most ethnocentric) for both origins were the highest (in absolute values), which shows that they attached more importance to origin Spain (positively evaluated) or Morocco (negatively evaluated) than those of cluster 2. These, in turn, did so more than those in cluster 3. This finding falls in line with the study by Casado-Aranda et al. (2020), who stated that people showed considerable ethnocentrism reward-related reactions when considering purchasing national products and, on the contrary, risk-related reactions when products came from foreign countries.

For farming type, although the differences in clusters were significant, they were small. In all cases, conventional farming had negative utilities and organic farming positive, but this was the least important factor to influence accepting or rejecting oranges.

A very similar pattern was observed in the avocado pear study for origin. However, no significant differences were observed in clusters for the other factors. The three clusters showed important utilities for price and lower ones for farming type.

CONCLUSIONS

Consumers agree that organic food respects the environment more, contains fewer “chemicals” and is more natural. Price is the first reason why many people do not buy organic food, followed by them thinking that they do not offer any added value and they are difficult to find. Distributors should make the sales of these products in supermarkets more visible.

The fact that a product is organic is one of the factors that least influences consumers’ purchasing decisions in Spain, who attach much more importance to country of origin, local production or if produce is seasonal. For this reason, distributors should highlight this information (country of origin and if it is local production) at points of sale.

Supermarket is the most frequent place to purchase fruit and vegetables, followed by greengrocers and markets, and a low proportion of the population buys them directly from producers or in organic food stores. Purchasing these products over the Internet is currently scarce.

This study reflects that Spanish consumers can be generally considered slightly ethnocentric people, especially older individuals who positively value the national origin of fruit and vegetables, and penalise products from countries that are direct competitors of Spanish production, such as Morocco, and particularly with local traditional products like oranges.

This study offers a vision of the trends of Spanish consumers in relation to fruit and vegetable preferences, which can help producers and distributors to design new strategies that focus on meeting consumer demands.

Given consumer preference for km 0/local and seasonal products, and the importance of these parameters for the environment and to promote rural areas, the administration together with different agri-food sector stakeholders should promote the market of such products, which would help to achieve some Sustainable Development Goals.

There are some limitations of this research work, such as the high proportion of female participants and the people with high level of education, although it is important to note that the statistical analyses showed that these factors did not strongly impact the results. Another limitation is the selection of attributes in the study on the importance of different parameters for purchasing fruit and vegetables or in the conjoint analysis (with only two fruit types), where the inclusion of more parameters, such as sensory attributes, would have been interesting. Future studies should consider combining online and face-to-face surveys so that the socio-demographic parameters can be more balanced, and to also include more attributes related to both intrinsic (i.e. sensory parameters) and extrinsic (i.e. credence parameters), to fully determine the main drivers that affect fruit and vegetable purchasing choices.

DECLARATION OF CONFLICTING INTERESTS

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Table 1. Attributes and levels used for the conjoint analysis of oranges and avocado pears.

Attribute	Oranges	Avocado pears
Price (€/kg)	1.49	3.99
	2.69	5.69
	3.49	7.99
Origin	Spain	Spain
	Morocco	Morocco
	Europe	South America
Farming	Conventional	Conventional
	Organic	Organic

Table 2. Mean values and standard deviation of the scores given by respondents in each cluster, in the survey on the importance of different parameters for purchasing fruit and vegetables, and in the survey on ethnocentrism (S1-S10 codes or statements).

	Cluster 1	Cluster 2	Cluster 3	
<i>Survey on the importance of different parameters for purchasing fruit and vegetables</i>				
Appearance is very important for me	5.4(1.5) ^b	5.0(1.5) ^a	4.8(1.7) ^a	*
Price is very important for me	5.1(1.4) ^a	5.3(1.4) ^a	5.5(1.4) ^a	ns
Them being km 0/local is very important for me	6.0(1.1) ^c	5.2(1.5) ^b	3.2(1.5) ^a	***
Country of origin is very important for me	6.4(1) ^c	5.1(1.7) ^b	3.5(1.7) ^a	***
Them being seasonal is very important for me	6.4(0.9) ^b	5.5(1.4) ^a	5.1(1.5) ^a	***
Them being organic is very important for me	4.3(1.5) ^a	4.0(1.5) ^a	3.6(2.0) ^a	ns
<i>Survey on ethnocentrism</i>				
S1: Spanish people should always buy Spanish-made agri-food products instead of imports	6.7(0.6) ^c	5.4(1.2) ^b	2.8(1.3) ^a	***
S2: Only those products that are unavailable in Spain should be imported	6.6(0.9) ^c	5.4(1.2) ^b	3.3(1.6) ^a	***
S3: Buy Spanish-made products keeps Spaniards working	6.8(0.5) ^c	5.4(1.3) ^b	3.0(1.5) ^a	***
S4: It is not right to purchase foreign agri-food products	5.0(1.5) ^c	3.1(1.4) ^b	1.5(0.8) ^a	***
S5: We should purchase agri-food products manufactured in Spain instead of letting other countries get rich off us	6.2(1.1) ^c	3.9(1.6) ^b	1.8(1.3) ^a	***
S6: It is always best to purchase Spanish products	6.6(0.7) ^c	4.7(1.5) ^b	2.2(1.5) ^a	***
S7: There should be very little trading or purchasing of goods from other countries unless out of necessity	5.7(1.2) ^c	3.9(1.5) ^b	1.4(0.7) ^a	***
S8: Spanish people should not buy foreign products because this harms Spanish business and leads to unemployment	5.6(1.2) ^c	3.3(1.3) ^b	1.5(0.8) ^a	***
S9: Curbs should be put on all imports of agri-food products	5.3(1.2) ^c	3.3(1.4) ^b	2.1(1.4) ^a	***
S10: Spanish consumers who purchase products made in other countries are responsible for putting their fellow Spaniards out of work	4.2 (1.6) ^c	2.3(1.4) ^b	1.5(0.8) ^a	***
Mean score of the survey on ethnocentrism	5.9	4.1	2.1	

Different letters in the same row indicate significant differences among the different clusters according to the Tukey test. * $p < 0.05$; *** $p < 0.001$; ns: $p > 0.05$ (no significant differences)

Table 3. Participants' personal data.

		Total		Cluster 1		Cluster 2		Cluster 3		χ^2 (p-value)
		n	%	n	%	n	%	n	%	
		364	100	145	39.8	195	53.6	24	6.6	
Gender	Female	261	71.4	119	82.1	126	64.6	16	66.7	**
	Male	103	28.6	26	17.9	69	35.4	8	33.3	
Age (years)	18-29	78	21.4	14	9.7	51	26.2	13	54.2	***
	30-49	155	42.6	55	37.9	92	47.2	8	33.3	
	50-65	126	34.6	73	50.3	50	25.6	3	12.5	
	> 65	5	1.4	3	2.1	2	1.0	0	0	
Level of education	Less than High school	20	5.5	11	7.6	8	4.1	1	4.2	ns
	High school	73	20.1	31	21.4	38	19.5	4	16.7	
	Bachelor degree or higher	271	74.4	103	71.0	149	76.4	19	79.2	
Income	< 800 €/month	12	3.3	6	4.1	5	2.6	1	4.2	ns
	800–1,500 €/month	67	18.4	34	23.4	30	15.4	3	12.5	
	1,500–3,000 €/month	153	42.0	57	39.3	83	42.6	13	54.2	
	> 3,000 €/month	99	27.2	35	24.1	60	30.8	4	16.7	
	Rather not say	33	9.1	13	8.9	17	8.7	3	12.5	

** $p < 0.01$; *** $p < 0.001$ (significant differences between clusters); ns: $p > 0.05$ (no significant differences between clusters)