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Are short food supply chains a sustainable alternative to traditional retailing?

A choice experiment study on olive oil in Spain

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ABSTRACT: This paper examines the consumers purchasing behaviour on Short Food Supply Chains (SFSC) using a choice experiment for extra virgin olive oil, as one of the most regularly food supplied through SFSC in Spain, and a cluster analysis to segment consumers by their perceptions and behavior. Results reveal that consumers` distribution channel preferences are similar although there is a negative reaction to online purchasing. Additionally, since there are consumers willing to pay more for local and organic food, opens opportunities for SFSC development. Hence, the implementation of policies encouraging the use of eco-environmental labeling, can foster SFSC development.

¿Son los canales cortos de comercialización de alimentos una alternativa sostenible al comercio minorista tradicional? Un estudio con experimentos de elección sobre el aceite de oliva en España

RESUMEN: Se examina el comportamiento de compra de los consumidores en Canales Cortos de Comercialización (CCC) utilizando un experimento de elección para el aceite de oliva (por su amplio uso en CCC), y un análisis cluster para segmentar los consumidores según sus percepciones y comportamiento. Los resultados revelan la similitud de preferencias hacia el canal de distribución, pero con una reacción negativa a la compra online. Al haber consumidores dispuestos a pagar más por alimentos locales y ecológicos, se abren oportunidades para los CCC. Así, las políticas que fomenten el uso del etiquetado ecológico, pueden potenciar el desarrollo de los CCC.

KEYWORDS / *PALABRAS CLAVE*: short food supply chains, choice experiment, consumers, olive oil, agri-food sector / *canales cortos de comercialización, experimento de elección, consumidores, aceite de oliva, sector agroalimentario*.

JEL classification / *Clasificación JEL*: Q01, Q13, Q18.

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1. Introduction

The food sector is one of the main sectors of the economy both globally and nationally. At the European Union level, France, Germany, Italy and Spain are the main food and beverage producers in terms of turnover, with the Spanish food industry accounting for 9.97 % of the EU total (Spanish Ministry of Agriculture, 2022a). In Spain, the food and beverage industry is the leading manufacturing branch of the industrial sector, according to the latest data from the Structural Business Statistics of the Spanish Statistical Institute (National Institute of Statistic of Spain, 2019).

One of the characteristics of the Spanish food industry is its high degree of atomization, which has traditionally affected the producer-distributor relationship. However, in recent years this sector has undergone several transformations, one of the most significant of which is the concentration that has taken place in the food distribution sector (Spanish Competition Authority, 2009). This, together with the changes produced in food commercialization and consumption means that large retailers have increasingly become the main connection between producers and consumers (Elghannam *et al.*, 2017).

This has created even more imbalances in the producer-distributor relationship, which has evolved from a situation where producers had bargaining power with respect to the sales terms of their products, to a new context in which distributors control this process, having also acquired the ability to influence and drive demand (Oubiña, 2000). As a result, producers find themselves in a problematic situation, unable to find stable markets and yields, receiving very low profits or even having to suffer losses, which limits their investment capabilities and damages their prospects of continuing their activity (Elghannam *et al.*, 2020).

At the same time, consumers do not benefit from this scenario either, since the reduced farm-gate prices received by producers do not translate into lower final prices for the food they buy (Elghannam *et al.*, 2020). This problem, which has been affecting the entire agri-food sector for years, appears periodically in the media when farmers go through some additional stress situation (e.g., imposition of import duties, closure or reduction of certain markets...) and publicly show their dissatisfaction. For example, in Spain in recent years there have been repeated complaints and demonstrations by agri-food producers about low prices at origin, the excessive added value obtained by the intermediate links in the marketing channels and the constant increase in production costs (García, 2020).

The concentration of distribution channels among a very limited number of companies gives them considerable decision-making power in the supply of foodstuffs. It allows them to set very tough contractual conditions in their relationship with farmers (Oubiña, 2000), compelling them to supply products with specific homogeneous characteristics, with very strict delivery conditions, and all of this at very low prices.

Agri-food supply chains have also been criticized for their adverse environmental and social effects (Wang *et al.*, 2019). Globalization and the development of international logistics networks are increasingly facilitating the marketing of food from different countries and thus outside their traditional sales periods. This, which may be positive for many consumers, who find more varied foods at more affordable prices (Canals, 2018). However, it has negative effects due to the environmental impact of transport and forcing, as well as to the loss of income for local producers who cannot compete in these contexts (Abate, 2008; Ingram *et al*., 2012).

All this reveals, on the one hand, the fragility of the position of producers and consumers in the food marketing chain, since the determination of purchase and sale prices remains in the hands of the most powerful link, despite the efforts of the regulatory authorities. But on the other hand, this unbalanced relationship also shows new opportunities through the development of new and more direct distribution channels alternative to the traditional ones and which could benefit both producers and consumers (Jarosz, 2008).

These short food supply chains (SFSC) could allow farmers to better control the pricing of their produce and become more independent. SFSC are also considered as a tool to help agricultural smallholdings to increase their participation in local markets, that being the reason why SFSC are considered a game changer, representing social innovation. They allow farmers and rural smallholders to resist the standardization of food, and in this way they promote greater recognition and better prices for quality food produce (Aubry & Kebir, 2013; Sonnino & Marsden, 2006). This also helps to promote relations of proximity within the urban food systems, contributing to enhancing food safety and sovereignty (Rosset & Altieri, 2018).

In short, SFSC have emerged as a promising sustainable alternative in terms of economic, social and environmental benefits (Giampietri *et al.*, 2018) that can affect rural development and economic regeneration (Kneafsey *et al.*, 2013). Thus, in conventional food chains, a high proportion of the products' market value is captured by manufacturers, processors, and retailers, while farmers hardly retain any added value (Augére-Granier, 2016). By minimizing the number of intermediaries, producers will be able to keep a greater proportion of what consumers pay for their food, which is an obvious motivation to try to sell it directly. Furthermore, according to some studies, the economic benefits of the creation of SFSC can go even further, since they have a greater impact on local economies than conventional/long channels (Migliore *et al.*, 2015) since they help maintain local employment, especially in rural areas (Kneafsey *et al.*, 2013; Rover *et al.*, 2017).

Finally, and regarding the environmental benefits, although the improvements in the environmental sustainability derived from short channels are less evident, some current studies (Wang *et al.*, 2019) have indicated a close link between environmental sustainability and their development.

Due to the above-described benefits, there is a growing development of SFSC in different countries around the world, although the weight of short channels in total food expenditure is very low (e.g., 1 % in Finland or 5 % in Spain). However, probably the potential advantages may not outweigh the inconveniences derived from their use (partial purchases, waiting times for delivery, doubts about the freshness of the product....) (Cruz *et al.*, 2021; Lyson & Green, 2008) and therefore further research is needed to evaluate this hypothesis.

In this context, this paper attempts to study the preferences of Spanish consumers towards food purchasing through short marketing channels. For this purpose, choice experiment was applied in order to analyze their preferences and the potential that SFSC could have. Subsequently, various consumer groups have been identified based on the respondents' behavior and attitudes towards the use of SFSC, which would help identify potential consumers and design appropriate policies.

Although the study focuses on foodstuffs in general, it was considered that it should be limited to a specific type of food to facilitate consumer responses. For this reason, and among the foods that are most commonly sold through short channels in Spain, extra virgin olive oil was selected, since it is also a staple food common to Spanish consumers and therefore regular in most households. Moreover, olive oil is produced in most of Spain and therefore has a strong local/regional component that could be relevant in the consumer's purchasing process (direct or through conventional channels) (Díaz, 2022; Spanish Ministry of Agriculture, 2022b).

This paper is structured as follows. First of all, the following section details the data collection procedure and methodology applied for this piece of research. Subsequently, Section 3 presents the main findings, which are later discussed in Section 4 in light of previous research on the topic and considering the policy implications that could be derived. Finally, Section 5 outlines the main conclusions of the study and indicates some recommendations for stakeholders, together with guidelines for future research.

2. Materials and methodology

2.1. Data collection

Data were collected in March-April 2021 through a sample of Spanish consumers. The questionnaire was designed using Google Forms (www.docs.google.com) with participants being recruited via e-mail, using research databases created from previous consumer studies. The widespread use of the Internet, which has become popular in the different segments of society, has led to an increase in the use of online surveys in agri-food marketing. This is due to their easy use, quick data collection and reduced cost, which compensate for the possible biases that tend to appear in this type of research (Elghannam & Mesias, 2019; Kayser *et al.*, 2013).

The questionnaire was designed in Spanish with closed-ended questions. It was divided into different blocks: purchasing and consumption habits, sustainability, lifestyle, sociodemographic questions and a choice experiment, in order to estimate the preferences of the consumers for SFSC. Lifestyle scale was based on the review of various research (Ortiz *et al.*, 2021; Polzin *et al.*, 2023) although adapted to include those items related to sustainable and environmental issues which could influence the use of short food supply chains. The reliability and validity of the scale was calculated using the Cronbach's alpha coefficient. The discriminant validity showed a good Cronbach's alpha value (0.75) which was above the 0.70 threshold and therefore considered acceptable.

The research was conducted in compliance with the University of Extremadura Bioethics and Biosecurity Committee regulations regarding studies with human participants. All participants consented to participate in the study and were assured that their responses would be kept confidential and completely anonymous. Respondents did not receive any compensation for their participation in the study.

TABLE 1

Sociodemographic characteristics of the Spanish population and the sample

		Spain	Sample
Age	18-35 y.o.	24 %	22 %
	36-50 y.o.	29 %	34 %
	>50 y.o.	47 %	44 %
Gender	Female	51 %	63 %
	Male	49 %	37 %
Level of education	Primary education	36 %	2 %
	Secondary Education	23 %	20 %
	University studies	41 %	78 %
Family size	1-2	56 %	36 %
	3-4	38 %	57 %
	5 and more	6 %	7 %

Source: Own elaboration and (National Institute of Statistic of Spain, 2019).

Although a total of 507 questionnaires were received, 6 of them were discarded due to several reasons, mainly incomplete answers, therefore the final number of valid questionnaires used in this research was 501. The design of the consumers'

questionnaire and its pretest should be closely related. A questionnaire should be designed in an appropriate, unambiguous, and unbiased way and should be capable of coping with all possible responses (Stone, 1993). To make sure that the questionnaire fulfilled these characteristics, a pretest of the questionnaire was conducted with 11 participants (these answers were not included in the final sample) in order to assure the clarity of the questions included and improve the final version of the questionnaire. Table 1 shows the sociodemographic characteristics of the sample and of the Spanish population.

Due to the sampling method used and the characteristics of the sample, the results of this study cannot be directly inferred to the Spanish population and should therefore be considered as exploratory research.

2.2. Choice experiment

In this study, choice experiment (CE) was considered as the most appropriate technique to estimate the preferences of consumers towards food purchased through short food supply chains.

CE is based on the idea that a good or service can be described by the attributes which comprise it (Lancaster, 1966), and that consumers make purchasing decisions based on these attributes (Steenkamp, 1987). A CE is characterized by the inclusion of alternative options of the same product carrying different attributes and prices, with the interviewee selecting the option or alternative which better reflects his/her preferences. This procedure is similar to the typical purchasing situation consumers face when buying products in the real markets (Van Loo *et al.*, 2011).

This technique has been reported as a useful tool in recent years to obtain consumer preferences and willingness to pay for different attributes of various products in the food sector. Also CE is a very useful analysing tool in order to obtain unbiased welfare measure (Barreiro-Hurle *et al.*, 2018). Its use is illustrated by diverse studies dealing with the analysis of preferences for olive oil (Juma et al., 2016; Panico et al., 2014; Yangui et al., 2014), environmentally friendly food (Eldesouky *et al.*, 2020; Lazzarini *et al.*, 2018; Lin & Nayga, 2022), local food (Hempel & Hamm, 2016), aquaculture food products (Banovic *et al.*, 2019) or meat and meat products (Altmann *et al.*, 2022; Díaz-Caro *et al.*, 2019).

Although the study had a main focus on food products in general, it was considered that it should be narrowed down to a specific type of product that participants could assess more easily. Therefore, the product presented to the participants in the CE was extra virgin olive oil. It was chosen for being a common staple food for the Spanish consumers and also because it is one of the food products with the highest percentage of direct sales in Spain (Spanish Ministry of Agriculture, 2013). The product format selected was a 5-liter plastic bottle, as it is the most frequently used in the Spanish olive oil market (Olimerca, 2020; Oliveclub, 2017).

The first step in a CE study is the selection of the attributes and levels that will make up the different products presented to the consumers. In this research, we have selected the attributes and their levels from a literature review of consumer preferences for olive oil (Bernabéu & Díaz, 2016; Chrysochou *et al.*, 2022; Dekhili *et al.*, 2011; Erraach *et al.*, 2014; Mtimet *et al.*, 2008; Panico *et al.*, 2014; Parras *et al.*, 2021; Van Der Lans *et al.*, 2001; Yangui *et al.*, 2014). The levels of the selected attributes must be realistic and cover the entire range over which it is expected that respondents may have preferences. Table 2 shows the attributes and levels selected for this study.

TABLE 2

Attributes and their levels used in the choice experiment

Attributes	Levels (base levels are underlined)
Origin	Local/regional; Spain; Imported
Production method	Conventional; Organic; Integrated Production
Purchasing Channel	Hypermarket/Supermarket; Traditional stores; Directly from producer; On-line stores
Price	3.5€/L; 5.5€/L; 6.5 €/L

Source: Own elaboration.

Although most of the attributes and levels used are common to other studies dealing with preferences for food, the "Production method" attribute presents some specificities. For this attribute, it was decided to include integrated production as a level, since it is a widespread standard for olive oil producers, who have adopted this alternative to conventional production as a way to respond to the retailers' demands of food products with lower residues (Lacaze, 2014; Silva *et al.*, 2018). This term, however, is quite unfamiliar to consumers, so it was decided to include the following explanation in the questionnaire:

> "Integrated production is a method of food production that uses natural and chemical fertilizers and phytosanitary products but trying to reduce their use to the maximum by also applying natural production mechanisms and a strict technical control, which contributes to sustainable agriculture."

Regarding price, it must be emphasised that it is an attribute widely used in choice experiments (Banovic *et al.*, 2019; Carzedda *et al.*, 2021; Vroegindewey *et al.*, 2021) to determine the willingness to pay for a product and its composing attributes, which is why this attribute was included in the analysis. Specifically, the three price ranges defined in this study were selected based on the authors' observation of retail prices of extra virgin olive oil in Spanish supermarkets, with a low price (3.5 €/L) reflecting the

cheapest oils (e.g. white label); a second price range (5.5 €/L) for average prices; and finally, a third price range (6.5 €/L) for higher quality oils, such as organic olive oils.

The total set of hypothetical products that can be created by combining the selected attributes/levels amounts to 108 (3 x 3 x 4 x 3), which would provide an excessive number of products to be compared by respondents. Taking into account that they are presented with "choice sets" that are made up of two products plus a "no-purchase" option, there would be a total set of possible comparisons of 11556 (108 x 107), which is unmanageable in economic and time terms. Therefore, a fractional design was used to reduce the number of comparisons to an efficient level by using Stata's "Dcreate" module, which allows such designs to be generated (Hole, 2015). This module uses Fedorov's modified algorithm to create an efficient design (Carlsson & Martinsson, 2003). Finally, six choice sets were created and used for the survey. Table 3 shows an example of a choice set.

TABLE 3

Example of a choice card presented to the respondents

Choice Card	Option A	Option B	Option C
Origin	Local/Regional	National	I would not buy any of these options
Production method	Organic	Conventional	
Purchasing channel	Traditional store	Traditional store	
Price	6.5€/L	5.5€/L	
I would buy option	( )	( )	( )

Source: Own elaboration.

Cheap talk was used to correct the hypothetical bias that can appear in this type of study. Thus, in line with previous research (Escribano *et al.*, 2021), a text explaining the hypothetical bias and its importance for the validity of the study was incorporated into the questionnaire. Finally, participants were asked to try to respond without bias to the CE, trying to actively put themselves in a real shopping situation.

2.3. Econometric model

Conditional logit has been used to assess consumer preferences. This model is based on Random Utility (McFadden, 1974; Train, 2003), which assumes that the utility function for each consumer is the addition of two components, a deterministic part that can be derived as a function of the factors influencing consumer utility and another random part, not directly observed and which is considered stochastic. Thus, the utility U_{njt} for a consumer n who chooses alternative j in the comparison t is:

$$U_{njt}=\beta_n' \, x_{njt}+\varepsilon_{njt} \quad [1]$$

where β_n' is the individual-specific vector of coefficients, x_{njt} is the vector of the observable attributes for individual n and ε_{njt} is the random term that is assumed to be an independently and identically distributed extreme value. Therefore, the probability that consumer chooses alternative j in the comparison t is given by the following expression:

$$L_{\mathrm{njt}}(\beta_{\mathrm{n}}) = \frac{exp\,(\beta_n' \, x_{njt})}{\sum_{j=1}^{J} exp\,(\beta_n' \, x_{njt})} \quad [2]$$

Base levels have been selected for each of the qualitative attributes in order to set a benchmark (zero utility) for the other levels of the attribute. The selected base levels were "Imported" (for the attribute Origin), "Conventional" (for Production method) and "Traditional stores" (for Purchasing channel).

The econometric specification used in this paper is therefore defined as follows:

$$\begin{gathered} U_{njt}=\beta_0 ASC + \beta_1 Local/Regional_{njt} + \beta_2 Spain_{njt} + \beta_3 Organic_{njt} + \\ \beta_4 Integrated_{njt} + + \beta_5 Hypermarket/supermarket_{njt} + \beta_6 Directly\ from \\ producer_{njt} + \beta_7 Online\ stores_{njt} + \beta_8 price_{njt} + \varepsilon_{njt} \end{gathered} \quad [3]$$

where β_0 relates to the present situation (ASC), i.e. do not purchase either of the two proposed products, and β_k is the marginal utility associated with each attribute provided by the specific product.

On the other hand, when we include the price as an attribute in a choice experiment, the marginal substitution ratio between a coefficient and the price is called the willingness to pay (WTP) for the specific attribute, which is calculated as follows:

$$\mathrm{WTP_k} = -\left(\frac{\beta_k}{\beta_{price}} \right) \quad [4]$$

Therefore represents how much consumers would be willing to pay in monetary terms for each increase in the level of attribute k provided by the product.

2.4. Cluster analysis

Calculations were made using the Cluster module of the IBM SPSS 21 statistical package, using a two-step procedure which combines the advantages of hierarchical and non-hierarchical clustering (Hair *et al*., 2014; Malhotra *et al*., 2012). The variables used for this analysis were those that sought to describe the behavior and attitudes of respondents towards the use of short food supply chains. Specifically, the following variables were used:

- Frequency of purchase of local/regional food; food purchased directly from the producer; organic food.
- Importance granted to different aspects when purchasing food: origin; quality certification; organic labeling; impact of the production process on the environment.
- Willingness to buy different types of food directly from the producer (either at a market, at their farm/business, on the internet...): cheese and dairy products, meat, wine and other drinks, preserves, edible oils and fruit and vegetables.

The selection of those variables related to organic production or quality labeling arose from the current relevance of organic food in short channels. In addition, it has been assumed that consumers interested in purchasing through short channels could seek not only the guarantee of the producer, who is sometimes unknown, but also an additional one, such as that of a Designation of Origin or other quality scheme (Yangui *et al*., 2019).

Firstly, a hierarchical clustering with Ward's Method was conducted using the abovementioned input variables. The final number of clusters was decided based on the agglomeration coefficient provided by SPSS (Hair *et al*., 2014) with two solutions with 3 and 4 clusters being obtained. Subsequently, K-means cluster analyses were carried out using the cluster centroids from the hierarchical analysis as the initial cluster seeds for the non-hierarchical procedure. Finally, the criteria used to decide the definitive solution were based on the size of the clusters obtained, the significant differences between the clusters across the clustering variables and the external validation through the interpretation of the clusters (Hair *et al*., 2014). Taking all this into account, a 3-segment solution was finally selected.

3. Results

3.1. Choice experiment for the overall sample

Table 4 shows the results of the conditional choice model for the overall sample. The sign of the estimated coefficients indicates if the presence of an attribute's level adds (positive sign) or detracts (negative sign) utility to the consumers to or from the

reference level of this attribute ("Imported", for the attribute Origin; "Conventional", for Production method; and "Traditional stores", for Purchasing channel). As stated in the methodology section, reference levels are supposed to present zero utility for the consumers.

TABLE 4

Results of the choice model for the overall sample

Attribute level	Coefficient	Standard error	p- value[1]
Local/regional	1.464	0.127	***
Spain	1.071	0.076	***
Organic production	0.674	0.115	***
Integrated production	0.220	0.088	**
Hypermarket/supermarket	0.055	0.098	n.s.
Directly from producer	0.017	0.092	n.s.
Online	-0.615	0.096	***
Price	-0.228	0.027	***
No-buy	-0.163	0.151	n.s.

[1] Significance at: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$; n.s.: non-significant;
Log pseudolikelihood = -2628.2119; Prob > chi2=0.0000

Source: Own elaboration.

As can be seen from table 4, most of the coefficients were significant at the 5 % level, with just two levels of the "Purchasing channel" attribute (Hypermarket/supermarket and directly from producer) that were non-significant. The lack of significance of these two levels means that there is not any difference with regard to buying in "traditional shops". This, together with the negative and significant utility from buying "online", reveals that consumers prefer to buy extra virgin olive oil through conventional channels, but they do not mind the way of doing that.

Regarding the origin, it is the attribute presenting the highest coefficients, which shows its importance regarding the shaping of consumers' preferences for olive oil. The marginal utility provided by olive oil from a local or regional origin is significant and with a positive sign. It shows that consumers prefer a short supply chain in terms of distance and proximity to the producer, but they are indifferent in terms of

the number of intermediaries, since they do not care if they buy it directly from the farmer, or in a supermarket or a traditional shop.

In terms of production method, it can be seen that both organic and integrated production are preferred to conventional production. And finally, the price shows the expected negative sign, which implies that consumers respond negatively to increasing prices, a common finding in consumer research studies.

Although, as expected, the coefficient for the no-buy option is negative, which would indicate that participants obtain a higher utility from choosing one of the alternative olive oils than from the no-buy option (Van Loo *et al.*, 2014), in this study it was non-significant.

3.2. Consumer segmentation

Table 5 presents the results of the behavioral and attitudinal variables towards short food supply chains of the three segments that were generated by the cluster analysis, together with those of the general sample. It also shows the results of Chi-squared tests carried out to look for significant differences between the clusters. As complementary information, Table 6 presents a description of the sociodemographic characteristics of the three clusters.

From the results in tables 5 and 6, it can be observed that Cluster 1 includes 30.3 % of the respondents, being the group with the highest purchasing frequency for the three food groups (local, direct from the producer and organic). Accordingly, it is the one that gives more importance to quality/origin/environmental food attributes and the one that is more willing to buy food directly. This greater concern and willingness may be related to their higher level of education and to the fact that they are the ones who are most in charge of home food purchases.

Cluster 2, with 28.5 % of respondents, is the segment with the lowest purchasing frequencies, especially for food purchased directly from the producer, which is also reflected in its willingness to buy food directly or in the importance given to the different food attributes, especially the environmental impact. This group has the lowest educational level and –although not significant– the highest age level and the lowest levels of income.

As different authors argue (Dagevos, 2005; Diamantopoulos *et al.*, 2003) and can be observed in Table 6, sociodemographic characteristics have lost a great deal of their capacity to explain consumer groups. Thus, Verain *et al.* (2012) propose the use of other variables, such as lifestyles, in segmentation studies. For this reason, and to complete the overview of the consumer segments, Table 7 presents a description of their lifestyles, as well as that of the overall sample.

TABLE 5

Descriptions of the clusters and the general sample regarding the clustering variables (%)

Variable	Cluster 1 (N=152)	Cluster 2 (N=143)	Cluster 3 (N=206)	Overall sample	Significance[1]
Importance granted to …. when purchasing food (1: not at all important; 7: very important)					
Origin	5.40	4.27	4.94	4.89	***
Quality certification	5.10	4.31	4.87	4.78	***
Organic certification	4.70	3.21	4.06	4.01	***
Impact of the production process on the environment	4.36	3.15	3.73	3.76	***
Please assess your willingness to buy directly from the producer (either at a market. at his/her farm, on the internet...) the following food products (1: not at all likely; 7: very likely)					
Cheese and dairy products	6.45	2.81	4.90	4.77	***
Meat and meat products	6.28	2.66	4.67	4.59	**
Wine and other drinks	6.64	2.77	4.83	4.79	***
Preserves	6.29	1.90	3.74	3.99	***
Edible oils	6.86	4.40	6.02	5.81	***
Fruit and vegetables	6.80	4.57	6.00	5.84	***
Frequency of purchase of …. (1: less than once a month; 2: once a month; 3: two or more times a month; 4: once a week; 5: two or more times a week)					
Local/regional food	3.37	3.02	3.34	3.26	n.s
Food purchased directly from the producer	1.97	1.64	1.79	1.79	**
Organic food	2.51	1.88	2.21	2.20	***

[1] Significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$; n.s.: not significant.

Source: Own elaboration.

TABLE 6

Description of the sociodemographic variables of the clusters (%)

	Variable	Cluster 1 (30.3%)	Cluster 2 (28.5%)	Cluster 3 (41.2%)	Overall sample	Significance[1]
Gender	Women	68.2	62.1	60.5	63.3	n.s.
	Men	31.8	37.9	39.5	36.7	
Age	18–35 y.o.	22.7	25.0	25.3	22.4	n.s.
	36–50 y.o.	42.4	31.5	33.1	33.5	
	> 50 y.o.	34.8	43.5	41.6	44.1	
Family size	1–2	36.9	35.3	35.2	35.8	n.s.
	3–4	51.5	58.0	59.7	56.7	
	5 and more	11.5	6.7	5.1	7.5	
Level of education	Primary education	2.3	0.9	1.8	1.7	**
	Secondary Education	14.7	29.9	18.1	20.4	
	University studies	82.9	69.2	80.1	77.9	
Family income	<1,000 €/month	4.7	6.7	2.9	4.5	n.s.
	1,000–2,000 €/month	24.0	29.4	29.1	27.7	
	2,001–3,000 €/month	38.8	29.4	32.0	33.3	
	>3,000 €/month	32.6	34.5	36.0	34.5	
In charge of food purchasing?	Yes	94.7	88.7	85.5	89.2	**
	No	5.3	11.3	14.5	10.8	

[1] Significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$; n.s.: not significant.

Source: Own elaboration.

As shown in Table 7, lifestyles included in this study were related to sustainable and environmental issues which could be assumed to influence the use of short food supply chains. The highest scores were given in all the clusters to variables related to energy saving and recycling, and to a lesser extent to the influence of food on health, with cluster 1, which could be named “conscious consumers”, giving the highest scores to almost all statements. On the other side, all groups have little interest in buying local food or in online shopping, with this being especially prominent in Cluster 2 which has been therefore named “unconcerned consumers”. Finally, Cluster 3 has been called “average consumers” due to its ratings being around those of the overall sample.

TABLE 7

Description of the clusters' lifestyles (%)

Lifestyles	Cluster 1 (30.3%)	Cluster 2 (28.5%)	Cluster 3 (41.2%)	Overall sample	Sig[1]
Please rate each of the following statements according to whether they are totally (7) or not at all (1) adapted to your lifestyle					
I sort and recycle garbage in the appropriate containers	5.86	5.72	5.98	5.87	***
I try to save energy at home by using efficient electronic appliances, led lights	6.45	6.22	6.11	6.25	***
I try to walk or use a bicycle or public transport to move around for shopping or work	4.81	4.38	4.60	4.60	***
I try to reduce the use of plastics in my household by using recyclable bags for shopping	6.21	5.67	5.77	5.88	***
I try to buy local food or food from my region to reduce the distance that has to be transported from the production area to the supermarket/store	5.43	4.35	4.97	4.93	***
I try to buy more unpackaged or bulk foods to reduce packaging and pollution	5.00	3.90	4.59	4.52	***
I try not to buy online (both food and other products) as it has a greater environmental impact than physical shopping because they have to send product only to my house and it pollutes more	4.84	4.52	4.75	4.71	***
I am interested on food related information because I am concerned about the impact of food on my health	5.95	5.44	5.80	5.74	***

[1]Significance: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$; n.s.: not significant

Source: Own elaboration.

3.3. Preferences per cluster

Once consumers were classified into different groups according to their behavior and attitudes towards short food supply chains, it was considered that choice experiment, when applied to each cluster, would allow to discover diverse consumers' preference patterns. Table 8 lists the results of the choice model for each cluster.

The results of Table 8 for Cluster 1 are consistent with the characteristics of this group, since it was the one that gave more importance to the origin and to the fact that the food was organic. Interestingly, this cluster was the most likely to purchase olive oil directly from the producer, but here this variable again is not significant.

Cluster 2, on the other hand, showed the lowest frequency of consumption of organic food and was also the one that gave the least importance to the fact that the food was organic. Accordingly, the lack of significance of these coefficients in Table 8

means that, for those consumers, organic or integrated olive oil is not different from conventional. It is also the group that showed the lowest willingness to buy food directly from the producer (in all categories), which is reflected in the fact that it is the only group that shows significance at this level, and with a negative sign, which is consistent with its low predisposition.

TABLE 8

Results of the choice model for each cluster (significance between brackets[1])

Attribute level	Cluster 1		Cluster 2		Cluster 3	
	Coefficient (p)	Standard error	Coefficient (p)	Standard error	Coefficient (p)	Standard error
Local/ regional	1.669 (***)	0.224	1.582 (***)	0.289	1.083 (***)	0.224
Spain	1.252 (***)	0.166	0.993 (***)	0.148	0.931 (***)	0.128
Organic production	1.175 (***)	0.232	0.227 (n.s.)	0.229	0.820 (***)	0.202
Integrated production	0.427 (**)	0.191	0.001 (n.s.)	0.170	0.397 (**)	0.153
Hypermarket/ supermarket	0.200 (n.s.)	0.222	-0.031 (n.s.)	0.169	0 .074 (n.s.)	0.163
Directly from producer	0.173 (n.s.)	0.212	-0.312 (*)	0.186	0.122 (n.s.)	0.139
Online	-0.695 (***)	0.222	-0.786 (***)	0.178	-0.458 (***)	0.157
Price	-0.146 (***)	0.049	-0.330 (***)	0.062	-0.208 (***)	0.048
No-buy	0.509 (n.s.)	0.321	-0.764 (**)	0.317	-0.180 (n.s.)	0.229

[1]Significance at: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.001$; n.s.: non-significant

Source: Own elaboration.

Finally, Cluster 3 was an intermediate group between clusters 1 and 2 based on its characteristics, and this is also reflected in its choice results, where its coefficients follow the same pattern as Cluster 1 but with smaller values.

3.4. Willingness to pay

When the price is included in a stated preferences study, it is possible to estimate consumers' willingness to pay (WTP) for the level of an attribute. As a reference level has been set, WTP should be understood here as the difference in euros/liter between what the consumer is willing to pay for an extra virgin olive oil with a particular level in comparison with the baseline reference level. Table 9 presents the results of the WTP for the different levels of the attributes.

TABLE 9

WTP (€/liter) for the different levels of the attributes included in the study

	Cluster 1	Cluster 2	Cluster 3	Overall sample
Local vs imported	11.45	4.80	5.20	6.42
National vs imported	8.59	3.01	4.47	4.70
Organic vs conventional	8.06	n.s.1	3.94	2.95
Integrated vs conventional	2.93	n.s.	1.91	0.96
Hypermarket/supermarket vs traditional store	n.s.	n.s.	n.s.	n.s.
Directly from producer vs traditional store	n.s.	-0.95	n.s.	n.s.
Online vs traditional store	-4.77	-2.38	-2.20	-2.70

[1] n.s.: non-significant
Source: Own elaboration.

In Table 9, the willingness to pay has not been calculated for those coefficients that were not significant in Table 8 since, for the purposes of this analysis, consumers do not consider these levels to be significantly different from the reference level. Therefore, there would logically be no price difference between these levels of the attribute.

From the analysis of Table 9 we can observe the relative importance that consumers attach to the different levels of the attributes analyzed, since here we can compare the different WTPs that have been calculated. We can highlight the high willingness to pay of Cluster 1, both in terms of origin and production method, which makes it an ideal target for any marketing strategy, although it is also the group with the lowest willingness to buy olive oil online.

Finally, and regarding the Purchasing channel, the negative WTP of the level "Online" reflects consumers' preferences for olive oil purchasing from traditional shops, retailers or directly from the producer, that is on a face-to-face basis.

4. Discussion

The importance granted to origin in this study is in line with that of Dekhili *et al.* (2011), who found that origin was an important determinant in consumer choice for olive oil in Tunisia and France. Additionally, the fact that national origin is preferred to imported products, with the level "Local/regional" being granted the highest coefficient, is in agreement with other research about consumers' preferences for extra virgin olive oil (Yangui *et al*., 2014) where national, and specially local/ regional origins were preferred over imported oils.

In fact, the region of origin is believed to have a direct effect, and not only indirectly through perceived quality, on the preference for regional products in some consumer segments, in particular those who live in the region of origin of the products. The product's place of origin can trigger emotions based on consumers' experience with the region that can directly affect preference for the region's product. Consumer associations with the "region of origin" are sparked when consumers are familiar with the region and these associations are then used to evaluate the product. The level of success of regional products increases with the strength and favorability of consumers' associations with the region (Van Der Lans *et al.*, 2001). This can explain the preference of local/regional products in comparison to national/imported one.

With regard to the production method, the differentiation of extra virgin olive oil according to its method of production seems to give organic olive oil a comparative advantage over those produced conventionally or under integrated production. The preference of consumers for organic rather than conventionally produced olive oil has been found in previous research (Bernabéu & Díaz, 2016). However, other authors have found a negative preference for organic production in olive oil (Yangui *et al*., 2014) and argue that Spanish consumers already perceive olive oil as a healthy product and therefore do not seek the guarantee of organic production. Nonetheless, these latter results are not a common finding in terms of preferences for organic production. Probably the reason for this change in the willingness to pay for this attribute is the deeper information received during the last years regarding organic methods of production.

Regarding integrated production, the positive coefficient shown in Table 4 means that the concept is appreciated by consumers who associate higher quality foods with a positive influence on health (Lacaze, 2014; Silva *et al.*, 2018).

Finally, the structure of preferences with respect to the purchasing channel reflects the distribution of this product in the Spanish market, with a predominance of large retailers (supermarkets and hypermarkets) (Parras *et al.*, 2021). However, in this study the participants have shown the lower preference for online sales, whilst at the national level traditional stores are the least preferred channel for this type of product (Díaz, 2022; Spanish Ministry of Agriculture, 2022b). This discrepancy may be due to the bias that remains among participants despite cheap talk, and which may lead some consumers idealise traditional shops, precisely because of their very nature, even though they do not use them in a real shopping situation.

When analyzing the preferences per cluster, the choice coefficients for Cluster 1 are consistent with the fact that it granted more importance to the origin and to the fact that the food was organic. This result is in line with several studies (Dekhili *et al.*, 2011; Panico *et al.*, 2014) that identified a consumer segment who valued the origin –either in its local form or at the country level- more than the organic production system.

In Cluster 2, their negative preferences towards direct purchase from the producer indicate that these consumers are less concerned about local purchases and sustainability in general, although they do have some interest in labeling. Both their purchasing intentions and their lifestyles present the lowest values of the three clusters, and they can be identified, at least partially, with the indifferent consumers that have been detected in other studies (Panico *et al.*, 2014).

Finally, Cluster 3 presents similarities in terms of their preferences with respect to cluster 1. However, this group presents higher ratings than Cluster 2 and below Cluster 1 regarding decisive purchase factors, as well as for their lifestyles, resulting to be a group of "average consumers" found in various research on food products.

It is worth noting that the negative preferences about the online distribution channel can be explained by the possible interpretation that respondents make of the online level, and which could be identified as online platforms such as Amazon or Alibaba, more distant from the consumer than those owned by producers or supermarkets. This could have led to the generation of negative preferences regarding the purchase of the analyzed product through this type of channels.

Results for WTP show the high value consumers attach to local/national production, and which are in line with previous comments about consumers' preferences (Carzedda *et al.*, 2021; Dekhili *et al.*, 2011; Panico *et al.*, 2014). Respondents possibly linked their choice for local products to their higher perceived safety compared to international ones, which may be owing to the perceived harmful health impacts of a number of food contamination mishaps. The results also show a moderate willingness to pay for organic and integrated-production olive oil.

These findings are in line with previous works on food preferences, where the willingness to pay for the organic product was higher than its conventionally produced equivalent (Juma *et al.*, 2016).

WTP for production systems can also be highlighted, as they open interesting opportunities for olive oil producers. Finally, and regarding the Purchasing channel, the negative WTP of the level "Online" reflects consumers' preferences for olive oil purchased from traditional (and face to face) shops.

The differences in WTP across clusters show Cluster 1 as the most willing to pay for all attributes. This would indicate that these consumers not only are more socially and environmentally aware, but that this translates into their WTP, a fact that is in agreement with previous research (Eldesouky *et al.*, 2020; Van Loo *et al.*, 2015). Furthermore, the negative value related to online sales highlights again the predisposition for proximity shopping.

By contrast, Cluster 2 is the most price-sensitive and, therefore, it is the group with the lowest WTPs. Price-sensitive consumers segments are frequently found in studies related with preferences for olive oil (Chrysochou *et al.*, 2022) and other food products (Escribano *et al.*, 2021). However, and in line with the findings of this paper, several other studies that included environmental or social factors in the evaluation of consumer food preferences have also identified these segments of non-concerned but price-sensitive consumers (Eldesouky *et al.*, 2020; Escribano *et al.*, 2021).

5. Conclusions

The use of quantitative analysis provided a useful approach to gain insights into consumer acceptance of food purchases through SFSC. Even though this study is focused on extra virgin olive oil as a staple food common to Spanish people, when participants were asked about their willingness to purchase directly from producers, fruits and vegetables had a higher rating followed by edible oils and other food products with an over-the-average rating. This is one of the key findings of this study and makes it applicable for other products in the agrifood industry.

However, the results of this study revealed that, despite consumers' positive attitudes toward products with sustainability features, there are still various constraints preventing this attitude from being translated into actual purchases. In this regard, it is recommended that these products become increasingly available for customers.

While the SFSC implementation is beneficial to both producers and consumers, offsetting the disadvantages of reaching out and approaching consumers can help improve the situation. However, there is still need to develop online selling and marketing, since a negative attitude towards this supply chain has been found, even though this reflects their preferences to purchase on face-to-face basis.

Another interesting aspect is the positive valuation of proximity food, which is in line with consumers' growing concerns for healthier and more sustainable food. The strong willingness to pay for these products more than compensates the lack of preference for online channels, therefore facilitating the development of short supply chains at least in the segment of conscious consumers, which would be the market niche.

Therefore, SFSC can not only open up new opportunities for consumers by offering them healthier food, with less environmental impact and with a strong social component, by contributing to the maintenance of employment and population in rural areas. They can also help producers to set up more sustainable marketing chains, which improve their incomes by reducing their dependence on traditional distribution chains, which increasingly capture more added value and make it difficult for many traditional farmers to persist.

Although this research is exploratory in nature and its conclusions may not be directly generalized, it is considered that the results obtained can be extrapolated to other countries with similar characteristics to Spain with a view to the development of future research and the planning of marketing actions. However, additional replications of our study in other contexts are desirable to estimate differences in consumers' preferences and attitudes towards the purchase of this and other products from short food supply channels, given that consumers' familiarity, understanding, and trust, vary across nations.

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