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Sustainable agri-food products: A review of consumer preference studies through experimental economics

Lucio CECCHINI*, Biancamaria TORQUATI, Massimo CHIORRI

University of Perugia, Perugia, Italy

*Corresponding author: luciocecchini89@gmail.com

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Abstract: In the last few decades, the interest of consumers towards sustainable agri-food products has been growing. This trend reflects changes in the consumption patterns, which have been deeply influenced by the increased sensitivity concerning social and environmental issues. In this sense, several studies, with different methodological approaches, have investigated consumers' willingness to pay and its determinants for products with different sustainability labels. To systematise the obtained results, this paper offers a review of the studies that used experimental economics in studying consumer preferences for sustainable food and agricultural products. The 41 studies included in the review were selected on the basis of the pre-identified criterion according to the systematic review approach. Albeit discordant, the results show that a large share of consumers is willing to pay a premium price for products with eco-friendly and organic certifications. Animal welfare, 'local' production, or social certification appear to have a lower influence on consumer choice of purchasing. Additional information is able to modify consumer expectations and consequentially their willingness to pay, depending on the individual's responsibility and awareness.

Keywords: auctions, revealed preferences, sustainability labels, willingness to pay

A post-modern consumer is increasingly characterised by a more responsible and exigent buyer behaviour, increasingly providing attention to the 'mode of production' of food.

Individual satisfaction in food consumption depends more on the social and institutional context in which the product is obtained than on the characteristics of the product itself (Georgescu-Roegen 1968; Baudrillard 1981; Elliott 1999; Siegrist et al. 2006; Evans et al. 2010). In general, individual choices are no longer exclusively driven by the maximisation of the utility function according to the neoclassical theory, but includes social, ethical, and environmental factors in what is more appropriately defined as a function of 'happiness'. Considering this perspective, food choices become a strong tool for individuals' affirmation of the image (Frey and Stutzer 2002; Di Nallo 2005; Frey and Stutzer 2006; Cicia et al. 2012).

As a consequence, in the purchasing behaviour of this new 'consumer-individual', there emerge two main trends: the growth of demand for safe products in terms of food safety and the increasing interest for high quality food products. Therefore, food consumption is no longer the satisfaction of basic needs only but embodies requirements related to the sustainability of production processes from a social, environmental, cultural, and ethical point of views. In this sense, several studies have found positive willingness to pay (WTP) for different attributes related to several aspects of agri-food product sustainability (Caswell and Mojduszka 1996; Maietta 2004; Yiridoe et al. 2005; Becchetti and Constantino 2006; Caswell and Siny 2007; Vecchio and Annunziata 2015; Tait et al. 2016; Zhou et al. 2016).

Considering this perspective, the evolution of food consumption patterns has increased the importance of the analysis of consumer preferences, which has strategic importance both for public and private decision makers. Therefore, the interest of researchers has shifted from the study of the actual quality to that of the perceived quality of a good, which is one of the main drivers of demand for such products (Grunert et al. 1996; Brunsø et al. 2002; Vranesevic and Stancec 2003; Caswell and Siny 2007).

The methodologies used to investigate consumer preferences and estimate the WTP could be classi-

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fied into two main categories. The first one includes techniques based on the use of stated preferences, such as contingent valuation, conjoint analysis, and discrete choice experiment (DCE). Based on revealed preferences, the second methodology can be divided in two subcategories: the first includes all the techniques based on market data, while the second concerns all experimental economics techniques, such as experimental auctions, field experiments, and laboratory experiments (Lusk and Hudson 2004; Breidert et al. 2006).

As a large number of studies have considered this topic with different methodologies, in this paper, we will only consider the papers that have used experimental economics in the study of consumer preferences for sustainable food and agricultural products. This choice is motivated by the significant success that experimental economics approaches have achieved since the 1990s due to the advantages that they offer.

These advantages are mainly represented by the high degree of control and reproducibility that the laboratory offers, and the 'no hypothetical choice' context that economic experiments configure. Replicability refers to the possibility of reproducing the experiment and verifying the results independently. Control is related to the ability to manipulate laboratory conditions, such that the observed behaviour can provide useful information to the evaluation of economic theories or alternative political strategies (Croson 2002). The laboratory also offers a very high degree of control of the external conditions, allowing researchers to measure the impact of changes to the explanatory variables (treatments) with respect to a certain dependent variable, in *ceteris paribus* conditions.

The randomised assignment of individuals to different treatments allows one to eliminate any bias in the econometric estimates due to the selection of the participants (selection bias).

Moreover, experimental economics techniques allow one to obtain data with a significantly higher level of reliability than those resulting from the application of methods based on revealed preferences, which are affected by hypothetical bias, as they do not bind concrete financial consequences for the participant (List and Gallet 2001; Morwitz 2001).

Therefore, a growing number of publications have employed the techniques of experimental economics in many countries with different types of experimental designs and combinations of attributes, different sample sizes, and different econometric models used for analysis, which provide heterogeneous results (Lusk 2003).

In this perspective, it appears necessary to carry out a work critical of systematisation and organisation of the existing literature, which is useful to highlight the main trends that emerged in the analysis of consumer preferences through experimental economics for products with sustainability attributes.

METHODOLOGY

To systematise all the available and relevant findings from experimental economics studies concerning consumer preferences for sustainable agri-food products, a systematic review approach is used. The definition of systematic review that is adopted in this study is the following, which is according to the Cochrane Collaboration (Higgins and Green 2011): 'A systematic review is a review of a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review'.

More concretely, the key aspects characterising this approach are: i) systematic search, in a pre-determined lapse of time, to identify all relevant studies considering the review criteria; ii) use of explicit criteria for the selection and quality evaluation of the studies; iii) use of defined methods for the aggregation and synthesis of the results from the included studies (NHS Center for Reviews and Dissemination 2001).

Regarding the search criteria, a literature research has been carried out using Business Source Complete, Science Direct, and Google Scholar online databases. The research concerned only publications in English language and considered a period of approximately 11 years, from January 2006 to December 2017.

For each database, the searching process considered different combinations (the same for each database) of the following keywords: 'sustainable food', 'sustainable produced food', 'sustainable label', 'sustainability', 'eco-friendly', 'animal welfare', 'social responsibility', 'experimental auction', 'auction', 'BDM (Becker, DeGroot, Marschak)', 'multiple price lists', 'real choice experiment', 'not hypothetical', 'WTP', and 'willingness to pay'. These combinations have to appear in any of the sections of the eligible article. 411 articles were identified throughout the database search, including double counts. Further, accurate screening of the identified papers was carried out

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to assess their relevance according to the aims of the literature review. Hence, the selection process of the resulting publications was carried out on the basis of the following criteria: i) relation with one or more of the three dimensions of sustainability (economic, environmental, or social) identified in the Brundtland Report (Brundtland 1987). In this perspective, only the products identified as 'sustainable', that is if they contribute, throughout their attributes and consequences, to improving one or more of these aspects (Reheul et al. 2001), are taken into consideration; ii) original content empirical research on consumer preferences in relation to this type of attribute; iii) use of non-hypothetical methods.

Based on the title, 257 articles were excluded as they did not focus on consumer preferences for food products with sustainability attributes.

The abstracts of the remaining 154 articles were assessed for eligibility, and 107 were excluded as they were either hypothetical or review studies.

Finally, 41 relevant studies were selected and included in the systematic review. The full-text of these articles was elaborately analysed to collect information relating to the research aims, methodology, sample, and main findings.

RESULTS AND DISCUSSION

The complete list of the publications analysed is contained in Table S1 (electronic suplementary material (ESM); for the suplementary material see the electronical version).

The following paragraphs show the main results obtained, which are divided as the overall results, results concerning the experimental economics methods used, results based on the objectives of the research, and results by category of sustainability attribute analysed. As mentioned in the previous section, we refer to the traditional concept of sustainability and sustainable development, which consider, according to the Brundtland Report (Brundtland 1987), the following dimensions: economic sustainability (profit), social sustainability (people), and environmental sustainability (greenhouse gas emissions, eutrophication). Within this general framework, the three dimensions considered were shifted to the following sub-categories: animal welfare and social responsibility, both dealing with the social dimension; eco-friendly (including different pro-environment production methods) and organic, both dealing with the environmental dimension, 'local' dealing with the economic dimension. This classification was adopted as animal welfare and social responsibility attributes, similar to organic and eco-friendly attributes, address rather different aspects, though concerning social and environmental issues, respectively. Indeed, on the basis of the sustainable attributes investigated by the selected papers from the review process, we decided to adopt such a five-category classification as the numerousness of the studies collected for each category allows for a separate discussion of their results.

General results

As shown in Figure 1, there has been a growing trend in the number of studies in the time period considered (2006–2017), demonstrating the increasing success of experimental economics techniques in this research topic.

Regarding sustainability aspects, most of the studies (54%) focus on environmental sustainability, categorised into multiple attributes linked to the presence of process and product certifications, such as the carbon footprint, reduction in the use of pesticides, and organic farming (Figure 2). Subsequently, 19% of the publications rely on social sustainability, taking into account attributes related to animal welfare, social responsibility, and fair-trade certification. Moreover, other studies (20%) have investigated attributes concerning more than one sustainability dimension and are therefore identified with the expression 'multi-dimensional sustainability'. Finally, a few studies (7%) have investigated the economic dimension of sustainability, analysing consumer preferences for 'local' products or with strong territorial links.

Considering the geographical distribution, Figure 3 shows that approximately 63% of the studies concern the European Union countries, where consumer awareness of sustainability issues is traditionally more developed, and consequently the scientific interest is greater. The second most represented continent in terms of publications is North America, with 29% of the papers almost exclusively realised in the United States of America. The remaining 8% of the publications are distributed between Asia (5%) and Africa (3%).

Results related to experimental economics methodologies used

The studies selected use a wide range of experimental economics methods. The most preferred

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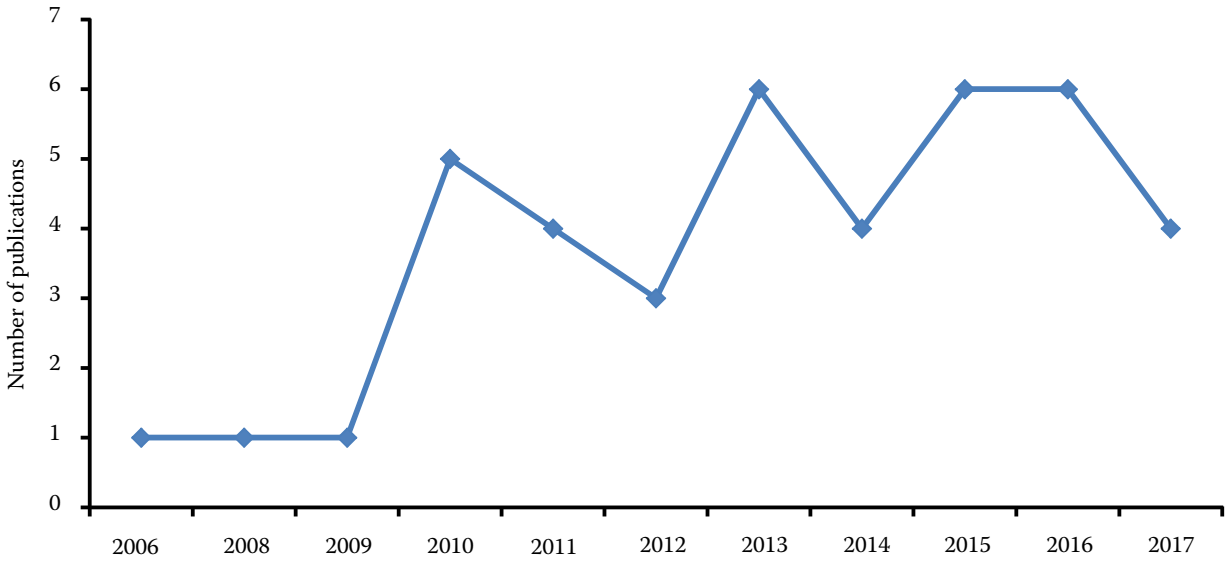

Figure 1. Number of publications per year

Source: authors' elaboration

methodological approach of experimental economics is represented by experimental auctions, utilised in several variations depending on the auction mechanism. In particular, the Vickrey auction and Becker, DeGroot, Marschak (BDM) procedure are the most commonly used, with approximately 32 studies (86%) carried out using these techniques. In the Vickrey auction, the participants propose secret offers for the product in the auction. In the original 2nd Vickrey, the highest bid wins the auction but pays the price only equal to the second highest bid. In the n^{th} Vickrey variants, an auction for the n^{th} offer is randomly drawn from the bids, and the $n - 1$ participant wins the auction and pays a price equal to the n^{th} bid for the auctioned product. The Vickrey auction is 'incentive compatible' (the weakly dominant strategy for all participants is to reveal their true reserve price), easy for the participants to understand, and easy for the researcher to implement (Lusk 2003).

The second price Vickrey auction, and its variants of the 5th and the random n-price, have been mainly used for experiments conducted in laboratory conditions involving participants gathered in sessions with the same size in terms of the participants (Hobbs et al. 2006; Napolitano et al. 2008; Akaichi et al. 2009; Costanigro et al. 2010; Napolitano et al. 2010; Gifford and Bernard 2011; Gracia et al. 2011; Elbakidze and Nayga 2012; Elbakidze et al. 2012; Grebitus et al.

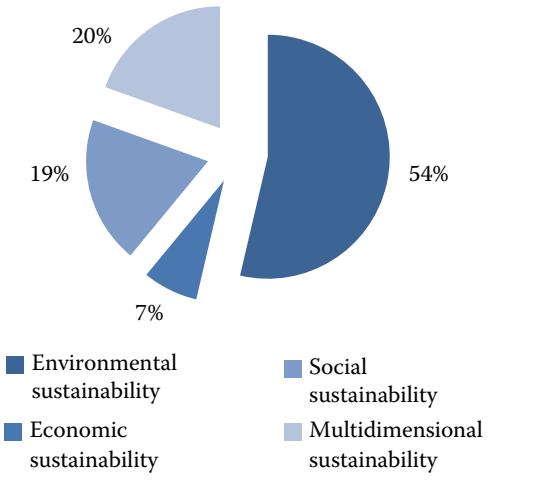

Figure 2. Distribution of the publications by investigated sustainability dimension

Source: authors' elaboration

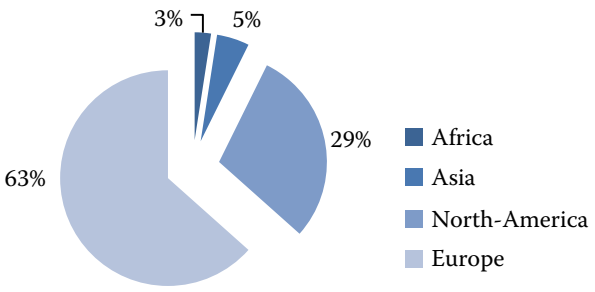

Figure 3. Distribution of the publications by country

Source: authors' elaboration

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2013; Sackett 2013; Vecchio 2013; Barber et al. 2014; Uchida et al. 2014; De Magistris et al. 2015; Boncinelli et al. 2016; Del Giudice et al. 2016; De Magistris and Gracia 2016).

The BDM procedure, often assimilated to the auctions, is similar to lotteries. In single or multiple sessions, the participants are asked to indicate the maximum price that they are willing to pay to buy the product in the auction. A number is then randomly drawn from a pre-defined prices distribution: if the price offered is greater than or equal to the number drawn, the individual buys the product and pays an amount equal to the drawn number (Rutström 1998). Otherwise, the BDM procedure ends without the sale taking place.

This incentive compatible mechanism was mostly preferred in the case of experiments carried out at the places of purchase (in-store), or at least in the case of application contexts with more critical issues concerning the management of the entire procedure (Bougherara and Combris 2009; Bazoche et al. 2010; Xue et al. 2010; Van Doorn and Verhoef 2011; Disdier et al. 2013; Disdier and Marette 2013; Bazoche et al. 2014; Barlagne et al. 2015; Chen et al. 2015; Lange et al. 2015; Vecchio and Annunziata 2015; Alphonce and Alfnes 2016; Cagalj et al. 2016; Marette et al. 2017). This is due to the flexibility and adaptability of the BDM, which also allows for individual recruitment of the participants.

Other studies have adopted the real choice experiment (RCE) approach, which is the non-hypothetical version of the choice experiment, where a series of sets of alternatives among all the possible attribute-level combinations are presented to respondents who are requested to order or judge the alternative or choose the preferred one in an active market environment. RCE is incentive compatible and presents a high degree of familiarity for the participants, therefore sometimes being preferred to experimental auctions (Olesen et al. 2010; Moser and Raffaelli 2012; Gracia 2014). In a few studies, calibrated auction-conjoint methods incorporating traditional hypothetical conjoint valuation of product attributes with real market behaviour using real economic incentives are used for products with a large number of attributes and levels as well as to estimate the WTP for a greater number of products (Norwood and Lusk 2011; Avitia et al. 2015). Finally, in other papers, two or more experimental auction methods and multi-unit auctions have been implemented, in order to compare the results obtained and to quantify the WTP for additional product units (Elbakidze and Nayga 2012; Elbakidze et al. 2012). Indeed, multiple auctions allow the auctioning of two or more items (identical or different) per lot. Depending on the method, the participants can bid for only one product or for the quantity that they freely desire. All the studies are based on sample surveys, partly using representative samples of the target population and stratified by major demographic criteria, and others with convenience samples. In the latter case, participants are consumers recruited, in most cases, in a business context of purchase, while in a few cases they are students or members of the academic staff. The average sample size of the analysed studies is 164 units.

In experimental auction studies, the bid offered by the participants is used as a dependent variable in a regression model, including covariates, socio-demographic characteristics, personal values, and product attributes. In the case of RCE, a discrete-choice modeling (DCM) approach is adopted to evaluate the presence of the sustainable attributes that affect the choice.

Results of the research aims

Generally, the different experimental economics methodologies described above were adopted in order to: i) determine the consumers' WTP for agri-food products with extrinsic attributes related to the presence of certifications and labels regarding compliance with sustainable production methods; ii) identify the main factors affecting consumer preferences and assess their relative importance in driving the choice of purchase; iii) test the effect of different information treatments concerning the investigated sustainability attributes on the formation of consumers' expectations and WTP; iv) test the influence of sensory characteristics on consumers WTP for sustainable products and test the role of taste in confirming the perceived quality for these types of products.

Results for the category of sustainability attribute

Below, we analyse the results obtained concerning the main findings sorted by the category of sustainability attributes studied in the following order: animal welfare, 'local', organic, eco-friendly, and social responsibility. The numbers of papers belonging to each category (*n*) is reported in brackets.

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Animal welfare (n = 7)

The first sustainability attribute analysed refers to the presence of animal welfare certification. Although the number of studies focused on in this aspect is rather limited (7) in comparison to the other types of sustainability attributes, in recent years, there is growing scientific interest around studies on consumer attitudes towards livestock management methods. The results clearly show that at the time of purchase, albeit with different socio-economic characteristics and different personal values and attitudes, consumers consider the information on animal conditions as one of the main determinants of choice (Napolitano et al. 2008; Gracia et al. 2011; Elbakidze and Nayga 2012; Elbakidze et al. 2012).

More specifically, two main results could be highlighted. The first one is represented by the presence of a WTP a premium price for products obtained by production methods respectful of animal welfare in comparison to conventional products, although the extent of this price is strongly influenced by different factors. The first factor is the type of auction procedure, where a full bid determines a greater WTP in individuals than the endowment approach (Gracia et al. 2011). Moreover, the adoption of multi-unit auction results in a substantial cancellation, for the additional units, of the positive WTP showed toward the first product unit (Elbakidze et al. 2012). The second factor is the type of product considered. Consumers tend to bid higher values for fresh products than for non-perishable products (Elbakidze and Nayga 2012; Elbakidze et al. 2012), or show differences in WTP premiums for the two products (pork chops and ground pork) from the same animal (Ortega and Wolf 2018). The second finding concerns the role played by information of production methods: consumer expectations are clearly influenced by additional indications on animal welfare standards, and thus their WTP moves in the direction of expectations as long as the consumer has a high level of awareness about animal welfare issues (Elbakidze and Nayga 2012; Elbakidze et al. 2012).

The introduction of tasting tests in the experimental design confirms that providing information about animal welfare to the consumers can be a major determinant of consumer WTP for animal-based food products, but it simultaneously underlines how sensory and organoleptic characteristics, not generally accepted, could decrease the WTP value expressed only based on information (Napolitano et al. 2008). Therefore, the discrepancy between the expected WTP, when consumers have only information about animal welfare, and the actual WTP, when they can also taste the product, demonstrate how most consumers would perceive the sensory and organoleptic characteristics that could be positively correlated to high animal welfare standards.

'Local' (n = 5)

The second category of attributes analysed is represented by 'local' products, which are investigated based on a few of the reviewed studies (5 of 41).

These studies emphasise on two main findings. Firstly, the lack of a positive price premium in itself for 'local' products, except in one case and to a limited extent (Gracia 2014), without such products being accompanied, as already reported for the animal welfare attribute, by good taste (Hobbs et al. 2006; Boncinelli et al. 2016).

Secondly, studies including taste test underline a substantial predominance of taste than the presence of 'local' attributes in determining consumer choice (Hobbs et al. 2006; Costanigro et al. 2010). In the papers using blind tastings, the results show negative disconfirmation with a relative reduction in the premium price initially stated based on the expectations induced by the presence of the label 'local product'. Therefore, the consumer does not appear to assign a priority to agri-food products with a strong territorial characterisation in comparison to conventional products and seem to show a sort of polarisation against conventional products (Costanigro et al. 2010).

From the point of view of business strategies, this implies that firms can not only rely on certifications that ensure the product's origin, particularly for product categories with standardised well-known sensory characteristics, such as wine or beef, concerning which consumers are primarily interested in a pleasant tasting experience (Hobbs et al. 2006; Boncinelli et al. 2016).

Considering this, the administration of additional scientific information does not appear to have a significant effect on consumer WTP for 'local' agri-food products. Therefore, the benefits aspects of these products are not yet clearly perceived by consumers.

Organic (n = 12)

Within the environmental sustainability dimension, one of the most investigated categories of attributes

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is represented by the organic method of production. All the selected studies have found a price premium for organic products than conventional products, albeit with differences in terms of the extent of the differential amount, depending on the methodology used. In the case of RCE, the estimated premium is significantly higher than the experimental auctions, indicating how consumers tend to increase their bids when they are asked to choose between different options than when they reveal their reserve price (Olesen et al. 2010; Alphonce and Alfnes 2016).

However, the bids obtained through experimental auctions are, on an average, from 32 to 80% higher for organic products than the conventional ones, depending on the type of product and the information provided. Thus, this demonstrates the high level of familiarity and awareness of consumers with organic certification, which has been present for more than two decades in Europe. This is also confirmed in the studies that have compared different attributes of sustainability, which concluded that organic certification is strictly preferred, in terms of WTP premiums, to any other sustainable production certification, such as 'natural' or 'local' labels (Moser and Raffaelli 2012; Sackett 2013; Avitia et al. 2015; Alphonce and Alfnes 2016; Bazzani et al. 2017; McFadden and Huffman 2017).

In addition, the results obtained in several papers have pointed out that consumers of organic food are more influenced by attitudinal factors, such as health and taste, rather than by socio-demographic factors. However, some studies underline the trend to recognise a greater differential in WTP for sustainable products, *ceteris paribus*, in the female, young, and highly educated individuals (Sackett 2013; De Magistris and Gracia 2016).

Among the attitudinal factors, awareness about food safety and organic production result in a positive influence on the WTP as well as a regular purchase behaviour of such products (McFadden and Huffman 2017). Conversely, the consciousness about health aspects, concerns about environmental issues and personality traits, do not appear to significantly affect consumer choices for these products (Avitia et al. 2015; Chen et al. 2015; Bazzani et al. 2017).

Finally, several studies show how consumers are deeply influenced by information related to organic production methods. Essentially, different treatments with positive, impartial, third-party, and verifiable information on organic foods, and on their environmental and health aspects are able to induce an increase in WTP without information by 16–46% (Napolitano et al. 2010; Gifford and Bernard 2011; Van Doorn and Verhoef 2011; Akaichi et al. 2012; Bazoche et al. 2014; Cagalj et al. 2016).

Eco-friendly (n = 12)

The most investigated category of sustainability attribute, in terms of related studies, concerns eco-friendly certifications. Although all these certifications focus on the environmental dimension of sustainability, a wide range of certifications related to several technical aspects was found. They include the reduced use of pesticides and productive input, as well as the use of sustainable cultivation techniques ('natural' produced food), pollution abatement (carbon footprint and water footprint), and waste reduction (Bougherara and Combris 2009; Bazoche et al. 2010; Xue et al. 2010; Disdier et al. 2013; Grebitus et al. 2013; Schmit et al. 2013; Barber et al. 2014; Bazoche et al. 2014; Del Giudice et al. 2014; Uchida et al. 2014; Barlagne et al. 2015; Marette et al. 2017).

The results of the studies considered show that the environmental certification label itself leads to a positive price premium in comparison to conventional products, quantifiable in a variable range from 13– 50% depending on the product type and on the certification requirements. The price premium is higher if the consumer has a high degree of familiarity with the certification owing to clear and balanced claims, allowing the consumer to understand the differences in comparison to conventional production methods. Only two works do not detect a higher WTP for the certified product until the addition of more information on the requirements of the certification. In these cases, the consumer does not associate the label to certification requirements and to clearly recognisable values owing to lack of information (Del Giudice et al. 2014; Uchida et al. 2014; Barlagne et al. 2015).

The studies that have tested the effect of different information treatments with both between and within experiments have not come to a clear conclusion about the role that the additional information provided to consumers on environmental sustainability standards have in influencing consumer choice. Essentially, in several cases, no effect on WTP was found after treatment (Bougherara and Combris 2009; Schmit et al. 2013; Bazoche et al. 2014), while in others studies a significant influence on price premium was detected, depending on the type of information. Only providing positive

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and verifiable additional information could increase the WTP for eco-friendly products (Uchida et al. 2014; Marette et al. 2017), while negative or biased ones could result in a decrease in the price offered for conventional products (Bazoche et al. 2010; Disdier et al. 2013).

Despite the fact that experimental evidence have widely recognised the role of environmental sustainability certifications, which is one of the main determinants of purchase of food products, some of the studies have pointed out, as well as already highlighted for organic certification, the need to ensure contemporary and high sensory quality of the products. Essentially, excluding the latter, the offered price premium based on the expectations could be reduced, or even cancelled, by a subsequent bad taste perception. The introduction of environmental certifications on products with a low consumer sensory liking does not entail significant effects on the WTP. Taste continues to be one of the main factors that affect consumer choices for agri-food products (Xue et al. 2010; Schmit et al. 2013; Bazoche et al. 2014; Barlagne et al. 2015).

Finally, few studies found a significant influence on WTP by attitudes, values, and personal characteristics: higher values were recorded, *ceteris paribus*, for individuals who were regular organic purchasers, with high label awareness and strong consideration of both social (defined in literature as 'self-transcendence') and environmental issues (Bougherara and Combris 2009; Xue et al. 2010; Barber et al. 2014; McFadden and Huffman 2017).

Social responsibility (n = 5)

The last category of sustainability attribute analysed consists of social and ethical certifications, referring to which scientific interest has grown, particularly in the last few years. Within this section, the following have been particularly included: products with fair trade, social responsibility certification, and other specific certifications in ethical and social topics. The economic experiments considered were mainly concentrated in France and Italy and revealed that, on an average, consumers tend to increase their WTP for products with ethical and social content than standard products. In particular, this WTP trend has been increasing from the 2000s, probably due to increased levels of awareness among individuals on such issues. Based on 2002 data, Lange et al. (2015) found that consumers were willing to pay more for certified products than conventional ones, but were conditioned to positive sensory acceptance of the product. Conversely, more recent studies suggest that social and ethical certifications lead to a price premium (Disdier and Marette 2013; De Magistris et al. 2015; Vecchio and Annunziata 2015).

Moreover, two studies (Vecchio 2013; Vecchio and Annunziata 2015) highlight that fair-trade certification is preferred to environmental certifications (carbon foot-print and Rainforest Alliance) or other lesser known social solidarity certifications. Furthermore, in these studies, there emerges a positive and statistically significant effect on WTP of socio-demographic characteristics, including age, gender, purchase frequency of sustainable products, and household income.

However, concerning the effectiveness of information treatments, the results are rather heterogeneous: Lange et al. (2015) highlight how the WTP for fair-trade coffee has increased, subject to sensory acceptance after exposure to additional ethical information on the working conditions of operators. On the contrary, De Magistris et al. (2015) found no significant influences on WTP.

CONCLUSION

The analysis of the 41 reviewed studies employing different methodologies and in some cases with discordant results revealed that a large share of consumers is willing to pay a premium price for products with sustainable attributes. Generally, the results obtained show a certain preference for attributes linked to compliance with environmental requirements, such as eco-friendly or organic certifications, to which consumers have a high degree of familiarity and awareness as they are in use from many years. Consumers' WTP a price premium for products with animal welfare, 'local' production or social certification is lower and in some cases absent. However, where these extrinsic attributes are not accompanied by intrinsic attributes that ensure an adequate sensory level of satisfaction to consumer expectations, they have no influence on WTP.

The second conclusion concerns the influence of providing additional information about the mode of sustainable production: on an average, it is clear that the expectations of consumers are influenced by additional indications, both of positive and negative nature. Consequentially, consumers' WTP moves in the direction of quality expectations induced by information treatments, the effects, to an extent, depending on whether the individuals are sensitive to environmental, social, or ethical issues.

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This literature review has shown that the presence of sustainability certification and the administration of additional information, although they are among the main determinants of WTP for these products, do not appear to be the only factors that influence WTP. However, WTP is also expressed in relation to other aspects, including primary, sensory, and organoleptic characteristics. These aspects do not appear to be replaceable with extrinsic cues, such as sustainability certifications. Other factors driving consumer choices are represented by attitudinal factors, such as sensitivity towards food safety and environmental topics, and personal values concerning sensibility regarding social issues (self-transcendence, with a positive impact on WTP) or on the contrary, the trend towards a more selfish attitude (self-enhancement, with negative impact on the WTP).

In summary, this review highlights the main trends emerging from consumer preference studies based on experimental economics methods focusing on food products with sustainability attributes. In this perspective, the influence of information treatments, sensory characteristics of the product, and the personal value of the consumer were investigated and discussed. Furthermore, the comparison of heterogeneous results resulting from different types of experimental designs, econometric models, sample sizes, and different combinations of attributes considered can stimulate useful reflections for future research, and contemporarily push the researchers to reflect on the need to estimate the WTP with agri-business applications. In addition, our results depict a useful framework of thoughtful consumer preferences and reliable WTP estimates emerging from real payment settings, thus representing valuable information for the definition of evidence-based policy measures and regulations for emerging market segments, such as those regarding sustainable food products. Finally, some limitations characterising the review have to be discussed.

The first one concerns the number of studies considered, which is lower than the other comparable reviews found in the literature (Feldmann and Hamm 2015; Kottala and Singh 2015). In this regard, only including experimental economics based studies in the review could have played an important role.

In particular, a few of the reviewed studies have focused on categories of sustainability attributes, such as animal welfare, 'local', and social responsibility certifications, thus weakening the related founded results.

The second key issue regards the adopted aggregation criterion for the results of the papers included in the review. Indeed, classification on the basis of the category of sustainability attributes investigated was preferred instead of considering the adoption of conceptual models. Among these, one of the most used approaches in the literature is the alphabet theory, which was adopted to identify the main consumption drivers and to predict the purchasing behaviour for organic (Zepeda and Deal 2009) and local products (Feldmann and Hamm 2015).

Based on these limitations, further developments can be considered along two different directions. The former relates to the need to undertake studies in different countries using comparable non-hypothetical survey methods and samples and considering experimental sessions over time, in order to obtain results that are able to significantly contribute to the existing literature on consumer preferences stability for different food products' sustainability attributes (Schaafsma et al. 2014; Marette et al. 2017). In addition, the resulting WTP premiums estimates have to be compared with producers' additional costs for improved standards and practices in a whole cost-benefit perspective that is able to elaborately understand consumer demand for such products (Ortega and Wolf 2018).

The second development direction deals with some specific aspects strictly related to the review process. The first aspect is the enlargement of the analysis timeframe to a greater number of years, in order to assess the evolution and changes in consumer preferences for sustainable agri-food products. Second, a larger sample of obtained papers could allow for the implementation of a meta-analysis to summarise the econometric estimates obtained in relation to consumers WTP for sustainability attributes that could strengthen the findings of this study.

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