Meta-Analysis of Consumers' Willingness to Pay for Sustainable Food Products

by Shanshan Li and Zein Kallas

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Abstract: There is a continuous increase in the number of studies dealing with consumers' willingness to pay (WTP) price premiums for sustainable food products. This research focused on a broad area of sustainable food products, including different sustainable attributes using a meta-analysis of 80 worldwide studies. The publication bias was verified using the Egger's test. In addition, the subgroup analysis and meta-regression were applied to classify the source of heterogeneity. The results suggest that the overall WTP premium for sustainability (in percentage terms) is 29.5% on average. Furthermore, gender, region, sustainable attributes, and food categories influence the average WTP estimates and their heterogeneity. Results also indicate that the WTP estimate conducted by hypothetical approach (choice experiment and contingent valuation method) is higher than non-hypothetical one due to hypothetical bias. In addition, the WTP estimate from the CVM is higher than that from the CE. Additionally, the WTP value of organic attribute is higher than the other sustainable attributes. The subgroup analysis indicates that the fruit &vegetable category has the highest WTP estimate while the seafood receives the lowest one. Results also highlight that Asian WTP estimates, in percentage terms, are higher than those obtained in North America and similar to those from Europe. In addition, positive WTP estimates are shown independent of the food categories, region or methods, denoting the presence of great market potential for sustainable products worldwide. The findings of this research can be used as a guide by food producers, marketers, and policymakers when making decisions related to the sustainability of food products.

Keywords: willingness to pay (WTP); Sustainable food products; Meta-analysis; Meta-regression

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1. Introduction

In recent years, food products produced by unsustainable and intensive production methods have caused some negative impacts on human well-being, society, and the environment. Therefore, the demand for more sustainable food production systems and sustainable food consumption is becoming fundamental to sustainable development. The concept of sustainable food is complex and encompasses issues relating to biophysical, social, and economic environments (Brklacich et al., 1991). Sustainable agricultural production is a systematic concept, which integrates three main objectives: a healthy environment, economic profitability, and social & economic equity. More specifically, food should be safe, delicious, naturally ripened, healthy, nutritious, acceptable, and affordable for consumers. It should also guarantee fair profits for farmers, workers, and retailers, enabling a high welfare state and wellbeing. In addition, sustainable food production should be beneficial to the environment, by reducing energy consumption, respecting animal welfare, using environmentally friendly agricultural technology that reduces the use of chemicals, protecting citizens' health and maintaining human and rural communities.

Consumers are demanding products with high sustainable standards. Thus, the sustainability concept within the food systems is becoming a prominent and politically complex issue that has received attention from policymakers and researchers. In fact, consumers have increasingly paid attention to the wider ethical issues and sustainable food products. Local products, animal welfare products, fair-trade products, seasonal agricultural products, and more globally, carbon footprints products are just a few examples of this growing trend (Codron et al., 2006). Measuring willingness to pay (WTP) is an acceptable tool to understand consumers' attitudes and opinions towards sustainable attributes in food products. The WTP estimates represent the price premium or the maximum amount that a current or potential consumer is willing to pay for a product or good (Tully and Winer 2014). Understanding consumers' WTP will allow policymakers and multi-agents stakeholders to carry out and design more socially acceptable policy actions that ensure sustainable food production.

To promote sustainable agriculture, an abundance of empirical studies has attempted to investigate consumers' WTP for sustainable food products. The main results showed that the majority of consumers were willing to pay a premium price for sustainable products (Laroche, Bergeron, and Barbaro 2001). For example, Chinese consumers' WTP for sustainable milk reached an additional 40% on the average conventional milk price (Gao et al., 2016). Another study revealed that most Spanish consumers were willing to pay a higher price for sustainable wines (Sellers, 2016), while the WTP values were heterogeneous depending on market segments.

In this context, there are some literature reviews focusing on consumers' WTP for sustainable food products (Katt & Meixner, 2020; Schäufele & Hamm, 2017). However, integrating different literature adopting systematic review and meta-analysis for consumers' WTP towards sustainable food products from a wider range has not been conducted. In addition, meta-analyses literature of WTP for animal welfare products (Clark et al., 2017) and organic food (Xia & Zeng, 2008) have been studied, but focusing on only one specific sustainable attribute. To fill this gap, this research helps to broaden the study of WTP for sustainable food products from a broad area, including different sustainable attributes simultaneously, by extracting data from the previous literature using a meta-analysis. Furthermore, the results will be more accurate using meta-analysis and provide reliable evidence for policymakers and sustainable food producers.

The main objective of this study is twofold: firstly, to synthesize consumers' WTP studies regarding sustainable food products; and secondly, to measure and compare the average WTP towards sustainable food products worldwide and their heterogeneity.

2. Data and Method

2.1 Strategy of literature search

The available studies relevant to consumer's preferences and WTP for sustainable food products (from 2000 to 2020) were identified from the electronic databases of Google Academic search and the Web of Science. Other databases (e.g., Scopus and PubMed) were excluded due to few related articles. The following keywords were used: "consumer preferences", "willingness to pay (WTP)", "consumer behavior", and "sustainable food products". In order to reduce publication bias (Rothstein et al., 2006; Stanley, 2011), we also searched unpublished data and "grey" literature (informally published material such as conference abstracts) by scanning some researchers' and institution websites. Included studies were based on "English", mainly "a choice experiment (CE) or contingent valuation method (CVM)", "willingness to pay or price premium or preferences". Finally, 80 papers were included based on three criteria: firstly, the topic of research was consumers' WTP for sustainable food products or sustainable attributes. Secondly, the study reported the average consumers' WTP value for sustainable food, whether it was in monetary form or percentage form. Thirdly, studies adopting stated-preferences methods and revealed-preferences both were included. The flow chart for the exclusion/inclusion process was presented in Fig. 1.

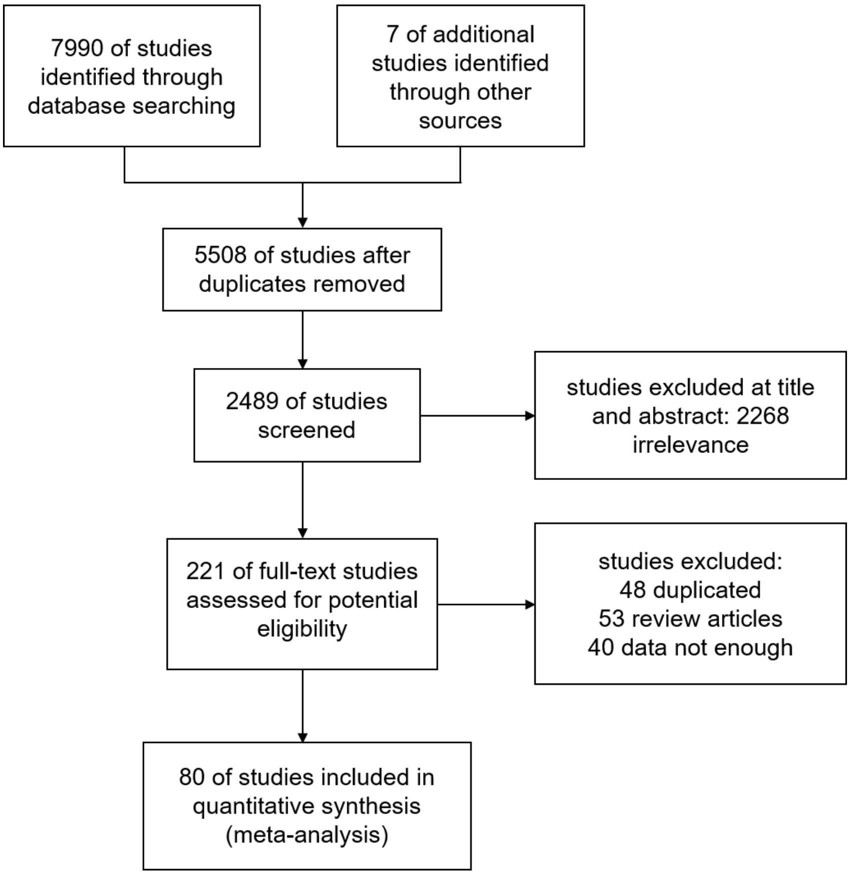

Fig.1 The flow diagram of the search and selection process

2.2 Data extraction and critical analysis Information

In this meta-analysis, standardized average WTP value in included studies was taken as effect size. This was in agreement with the study of Xia and Zeng (2008). Mean WTP is a measure that involves utility levels subjectively estimated by consumers, which reflects complex and subjective perceptions (Dolgopolova & Teuber, 2018). In order to tackle the currency difference issues and different WTP formats (i.e., the weight unit, product unit, and category), all WTP estimates were presented in percentage form. The WTP value, represented as the dependent variable in this analysis, was the price premium which meant the percent payment increased over conventional food price (Lagerkvist & Hess, 2011). Therefore, all WTP values in the 80 included papers were presented in the percentage form. For the monetary WTP, the transformation was as follows:

$$\text{WTP (\%)} = \frac{WTP\ sustainable - P\ conventional}{P\ conventional} \times 100\%$$

"*P conventional*" denoted the price of conventional food products. Some papers did not mention the price of conventional food products, the values of conventional products were searched, based on the year of data collection (Clark et al., 2017). Moreover, we extracted moderator variables to explain heterogeneity within the data. These were average values (income and age), percentages of the population (female, more than university education), and categorical moderators (sustainable food categories, region of study, sustainable attributes, and study method). Income was the annual household income, expressed in dollars because most papers provided income data in dollars.

The Egger's test was conducted to measure the publication bias. Furthermore, subgroup analysis was adopted to test the deeper heterogeneity of the data. I^2 statistics indicated the percentage of variance due to heterogeneity (Dolgopolova & Teuber, 2018). If this value was higher, it meant heterogeneity was more significant.

Finally, the meta-regression was used. Eight covariates (percentage of female, more than university education, the year of publication, income, region, methods, sustainable attributes, and food categories) were introduced so the Monte Carlo permutation test was conducted to reduce Type I error and improve the accuracy of the p-value. Tau^2 estimated the size of the variance component between-study. The smaller the value was, the better the model fitted.

3. Results

3.1 Descriptive statistics

In 80 included studies, 34 were from Europe, 21 were conducted in Asia, 21 were from North America, and the remaining 4 were from Oceania. Diverse WTP estimates for sustainable food products and attributes were measured. The sample sizes of individual literature were also different. The maximum size was 4103, which was studied in 8 European countries. Whereas, the minimum size was only 60 studied in Ukraine. Regarding valuation methods, 31.3% of the studies were CE, with 2 papers using non-hypothetical CE, and 33.8% were CVM. Only 8.8% of papers were using an auction experiment. 23.8% of the studies were other valuation methods. The lowest mean percentage WTP was 1.7% from Loureiro (2003), who studied sustainable wine in North America, while the highest one was 91.0%, studied in Iran for organic milk by Amirnejad and Tonakbar (2015), followed by tomato, which was studied by Cicia et al. (2006) in Italy and Skreli et al. (2017) in Albania with 86.0% and 85.0% WTP premium respectively. Annex 1 presented the characteristics of the studies included in the research.

3.2 Subgroup results

Before we conducted the subgroup analysis, the Egger's test was employed. The existence of publication bias in favor of studies with positive WTP for sustainable food products was confirmed by the result of the Egger's tests (Table 1) ($p = 0.00 < 0.01$).

Table 1 Result of Egger's test (N = 80)

Std_Eff	Coef.	Std. Err.	t	P>|t|	Lower 95% CI	Upper 95% CI
slope	0.03	0.04	0.87	0.39	-0.04	0.11
Bias	13.12	2.64	4.96	0.00***	7.82	18.38

Note: *** Significance level: 0.01. P = 0.00 < 0.01, denoting that there is a significant difference, which means significant existence of publication bias.

The summary of results for different subgroup analyses could be found in Table 2, Fig. 2, and Fig. 3. As can be seen, the WTP estimates of all subgroups were positive. The overall WTP estimate was 29.5%, with 95% CI (25.1%, 33.8%). The overall I^2 statistics was 99.5%, demonstrating that significant heterogeneity indeed existed within studies in this research. With regard to the results of the subgroups for socio-demographic characteristics (age and income) and the date of publication, it should be noted that the average age of only 2 articles was over 56. The results of age showed that the younger generation had a higher WTP value with 34.6%, while the 56 and older had the lowest WTP with 29.5%. Fig. 2 proved the result. Regarding the results of the subgroup for average annual household income, it demonstrated that those whose income was over $60,001 had the highest WTP with 30.7%, while those whose income was between $30,001 and 60,000 got the lowest WTP with 25.5%. With respect to the subgroup of date of publication, it showed that the WTP value of papers published before 2008 was lower (21.6%) than those after (31.0%). It should be noted that there were only 13 papers before 2008 (including 2008), meaning that the results should be interpreted with caution. The I^2 values of all three subgroups were over 90.0%, which demonstrated the existence of high heterogeneity.

Table 2 Summary of the results from the subgroup analysis

Subgroup	WTP Estimate	Lower 95% CI	Upper 95% CI	Study Numbers	p-value	I^2	
18-30 years old	29.8%	25.0%	34.6%	7	0.015	99.7%	Subgroup of age (excluding outlier)
31-55 years old	34.6%	6.7%	62.5%	61	0.000	99.4%	
56 and older	29.5%	25.1%	33.8%	2			
< $30,000	27.5%	15.9%	39.0%	25	0.301	90.6%	Subgroup of annual income
$30,001-60,000	25.5%	16.8%	34.1%	18	0.000	99.2%	
> $60,001	30.7%	20.6%	40.9%	6	0.047	98.1%	
year < 2008	21.6%	13.7%	29.6%	13	0.000	99.2%	Subgroup of date of publication
> 2008	31.0%	25.9%	36.0%	67	0.000	99.5%	
North America	25.5%	17.5%	33.5%	21	0.010	99.5%	Subgroup of region
Europe	31.9%	25.6%	38.2%	34	0.000	99.3%	
Asia	31.8%	20.6%	43.1%	21	0.020	99.7%	
Oceania	17.2%	4.9%	29.5%	4	0.006	98.0%	
drinks	25.3%	18.3%	32.2%	19	0.000	99.2%	Subgroup of food categories
seafood	16.6%	11.1%	22.1%	10	0.023	82.3%	
dairy	34.9%	14.5%	55.3%	8	0.001	99.2%	
fruit & vegetable	38.8%	26.6%	51.1%	20	0.062	99.6%	
meat	29.4%	19.8%	39.1%	15	0.000	99.3%	
EF	21.3%	16.5%	26.1%	25	0.030	98.9%	Subgroup of sustainable attributes
local	21.1%	12.2%	30.0%	11	0.000	98.2%	
organic	38.1%	28.2%	48.0%	29	0.028	99.6%	
fair-trade	30.5%	16.4%	44.6%	9	0.006	99.6%	
animal welfare	29.5%	25.2%	33.9%	6	0.104	98.9%	
CE	27.9%	20.7%	35.1%	27	0.001	99.5%	Subgroup of methods types
CVM	38.3%	28.4%	48.1%	25	0.009	99.7%	
non-hypothetical	26.7%	16.5%	37.0%	9	0.001	94.9%	
others	21.3%	14.7%	28.0%	19	0.000	98.9%	
Overall	29.5%	25.1%	33.8%	80	0.000	99.5%	Overall estimate

Note: I^2 means the variation in ES (effect size) attributable to heterogeneity, and all values are more than 80.0%, indicating the existence of high heterogeneity. EF: environmentally friendly.

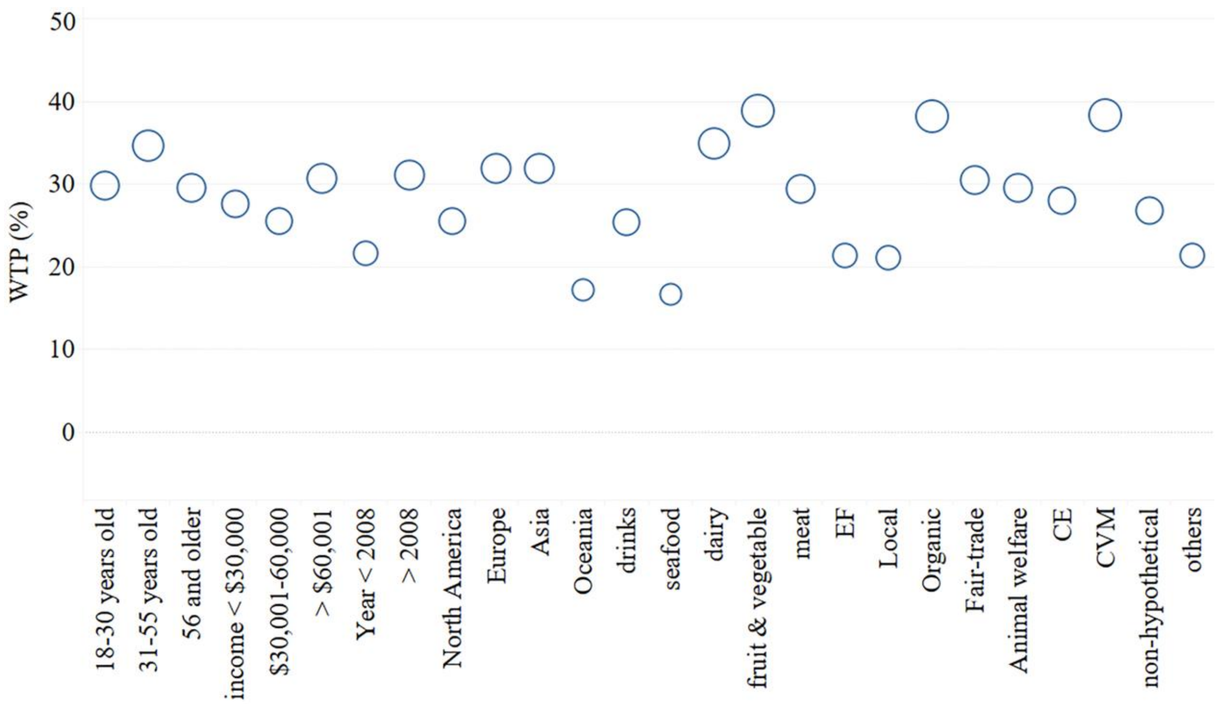

Fig. 2 Results of subgroup analysis

Note: The y-axis represents the size of WTP estimates, and the x-axis shows each subgroup. The size of the circle means the WTP value of each variable. Income means the annual household income, expressed in dollars. America indicates North America. EF demonstrates environmentally friendly.

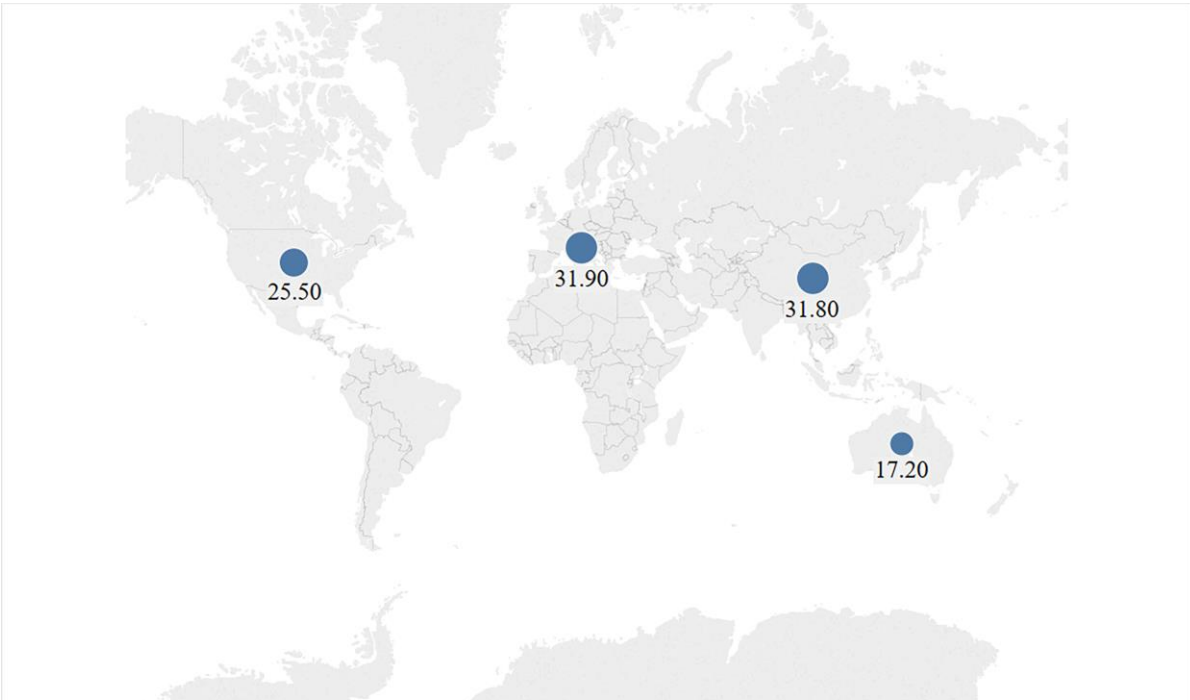

Fig. 3 WTP estimates of regions

Note: Circle size demonstrates the size of the overall combined WTP value of studies in each region.

All values are presented in the percentage form. This map indicates that WTP estimates from highest to lowest are Europe (31.9%), Asia (31.8%), North America (25.5%) and Oceania (17.2%).

As for the results of the subgroup for region, almost half of the research (42.5%) was conducted in Europe. While it should be noted that only 4 studies were from Oceania so the evidence was not conclusive. The results of the region subgroup (Table 2 and Fig. 3) demonstrated that the lowest WTP was in Oceania (17.2%, 98.0%), followed by North America (25.5%, 99.5%) and Asia (31.8%, 99.7%), and the largest in Europe (31.9%, 99.3%). The Asian WTP estimate was very similar to Europe both higher than North America. Additionally, a large heterogeneity existed among studies because I^2 values were above 98% for all four regions.

With respect to food categories, the data of dairy was only obtained from 8 studies. Analysis showed that seafood with 16.6%, obtained the lowest WTP estimate, and the highest one was for fruit & vegetable, with 38.8%. The WTP estimates of drinks, meat, and dairy were 25.3%, 29.4%, and 34.9%, respectively. I^2 value (82.3%) of seafood was the lowest, indicating that the heterogeneity was less compared with other food categories.

As for the result of sustainable attributes, the WTP estimates of EF (environmentally friendly) attribute and local attribute were similar, with 21.3% and 21.1%, respectively. The highest one was for organic attribute with 38.1%, followed by fair-trade and animal welfare attributes with 30.5% and 29.5%.

Regarding the subgroup analysis of method types, the result indicated that the WTP estimate of CVM was highest (38.3%), followed by CE (27.9%). Non-hypothetical methods got 26.7%. The category of others had the lowest estimate, with 21.3%. I^2 of CE and CVM were more than 99.5%, indicating relatively high heterogeneity in the data, while the heterogeneity of non-hypothetical methods and others were a little lower (94.9% and 98.9%). In general, the source of high heterogeneity did not be found using subgroup analysis.

3.3 Meta-regression results

Meta-regression was conducted to further identify the source of heterogeneity. The results were presented in Table 3. The overall p-value equaled $0.042 < 0.05$, which denoted significant differences at the significance level of 0.05. I^2 equaled 96.26% while 81.73% was the proportion of between-study variance explained. Tau^2 equaled 0.008, demonstrating the regression model fitted well. The results reported that all p-values increased compared with unadjusted p-values, and it meant that Type I error existed.

Table 3 Results of the Meta-Regression (excluding outlier)

				Monte Carlo permutation test	
	Coef.	Std. Err.	P>|t|	Unadjusted p-value	Adjusted p-value
female	0.467*	0.226	0.044	0.045	0.048*
university	-0.100	0.212	0.652	0.662	0.744
Year < 2008	-0.002	0.145	0.991	0.991	0.998
< $30,000	-0.082	0.160	0.617	0.701	0.756
$30,001-60,000	0.008	0.129	0.954	0.954	0.988
hypothetical	-0.029	0.092	0.757	0.768	0.798
dairy	0.183	0.108	0.095	0.095	0.098
drinks	-0.618*	0.062	0.012	0.012	0.014*
fruit & vegetable	0.222*	0.088	0.014	0.016	0.018*
meat	0.128	0.093	0.171	0.244	0.262
North America	0.614*	0.326	0.034	0.034	0.038*
Asia	0.571*	0.257	0.022	0.032	0.042*
Europe	0.644*	0.259	0.044	0.044	0.048*
EF	-0.314*	0.122	0.017	0.025	0.034*
local	-0.312	0.156	0.058	0.058	0.076
organic	-0.137	0.135	0.322	0.322	0.412
animal welfare	-0.150	0.150	0.329	0.436	0.488
_cons	0.221	0.366	0.570		
Number of obs	80				
Tau^2	0.008				
I^2	96.26%				
Adj R^2	81.73%				
Prob > F	0.042*				

Notes： *** Significance level: 0.001; ** Significance level: 0.01; * Significance level: 0.05. The results of the meta-regression indicated that the percentage of female, region, sustainable attributes and food categories were the sources of high heterogeneity in this study and they significantly influenced variations in WTP estimates across studies.

The results of the meta-regression indicated that the percentage of female, region, sustainable attributes, and food categories were the sources of high heterogeneity, and they significantly influenced variations in WTP estimates across studies. However, we found non-significant differences among the percentage of more than university education, income, date of publication, and methods of studies. First, the percentage of females ($p = 0.048 < 0.05$) highlighted a significant difference, showing that it was the source of heterogeneity. Second, regarding food categories, the results demonstrated that for drinks products (β = -0.618), WTP estimates were significantly lower than dairy and fruit & vegetable products. This was in line with the result of the subgroup analysis above. Third, the p-values of North America, Asia, and Europe were 0.038, 0.042, and 0.048, showing significant differences among studies and confirming this subgroup as a source of heterogeneity. Finally, the environmentally friendly attribute (β = -0.314) reported statistically significant lower WTP values, which was also similar to the result of the subgroup analysis above. However, results indicated non-significant differences among studies for local, organic, and animal welfare attributes.

4.Discussion and conclusion

It is necessary to find systematic evidence on consumers' WTP for sustainable food products. For this purpose, 80 publications are included and analyzed using meta-analysis. This study is focused on a broad area of sustainable food products and attributes. It is, to our knowledge, the first meta-analysis jointly assessing different sustainable attributes and the number of included papers is the largest in this field.

Firstly, our results show that the WTP value of the studies adopting hypothetical approaches is higher than non-hypothetical methods. This was consistent with the conclusion of Dolgopolova and Teuber (2018), who suggested that hypothetical elicitation methods resulted in higher WTP than non-hypothetical approaches. This result also coincided with the research of Martínez-Carrasco et al. (2015), who found CVM yielded higher values for WTP than the auction because of the hypothetical bias, which led to overestimation of values. The hypothetical bias was discussed and studied by many researchers in social and economics. In addition, the result shows that the WTP estimate from the CVM is higher than that from the CE, which is in accordance with the finding of previous research (Jin et al., 2018). It is because the design is less similar to actual market situations (List & Gallet, 2001; Zander & Feucht, 2018).

Secondly, it shows that the younger has a higher WTP value, while the 56 and older has the lowest WTP. It is consistent with some studies, which indicated that organic consumers were likely to be younger (Krystallis et al., 2006; Van Loo et al., 2013). However, it was opposite to the study of Bellows et al. (2008), indicating that older people tended to buy organic food regularly. This divergence could be related to the fact of considering organic products as an environmentally friendly alternative or as a healthy one.

Interestingly, Asian WTP estimates, in percentage terms, are higher than those obtained in North America and similar to those from Europe. A possible explanation for it might be that sustainable labeling in products is an incomplete marketing tool for products perceived as low quality in America, so there is a need to improve quality perceptions and knowledge for sustainable labels to obtain a premium in differentiated food markets (Loureiro, 2003). Furthermore, this outcome is also related to the fact that the price of North American products is more expensive than Asian countries. As for Asia, evidence can be found in the study of Wang and Huo (2016), who indicate food safety certification has increasingly received much attention by Chinese consumers since the melamine milk crisis in 2008. As a result, Chinese consumers have a higher WTP for ensuring food safety compared with any of the other attributes resulting from Chinese poor food safety record, coupled with a low level of trust in government safety certification schemes (Liu et al. 2010; Tait et al. 2016). In addition, European WTP is similar to the studies conducted in Asia, which is in line with the study of Tait et al. (2015), who suggest preferences are very similar towards sustainable food for both UK and Japanese consumers.

The results of this meta-regression suggest that female, region, sustainable attributes, and a variety of studying products influence average WTP estimates. The overall WTP is 29.5%. It is in accordance with the value of the current price premiums for organic attribute in the world, which is approximately between 20-40% (Xia & Zeng, 2008). It is also in line with Yi (2019), who concludes that consumers' average WTP towards sustainable products is 29%. 29.5% is higher than 16.8% from meta-analysis research focused on a socially responsible attribute (Tully & Winer, 2014) and higher than the finding of another meta-analysis study focused on organic attribute, which shows that the WTP for organic attribute is between 5-20% (Xia & Zeng, 2008). Nevertheless, this value is lower than those obtained in Y. C. Yang (2018) in Taiwan, with 254.0%, and Skreli et al. (2017), who suggests that the widespread positive preference is 85% of Albanian consumers for sustainable products. The existence of differences may be explained by the fact that Taiwan and Albanian consumers are mainly concerned about food safety and sustainable food can reduce their health risks, so they are willing to pay high premiums to tackle safety and health issues.

The findings of this research can be used as a guide by food producers, marketers, and policymakers when making decisions related to the sustainability of food products. Firstly, regarding the region's importance in the appearance of sustainable food products, consumers in Europe and Asia exhibited high WTP estimates, followed by North America and Oceania, suggesting that sustainable food marketing departments in the food business companies could additionally promote the sustainable attributes of their products in Europe and Asia. In fact, these results confirm the current rate of appearance of new sustainable food products at the market place in Europe and Asia compared to other regions. According to the last data we collected from the Global New Products Database (GNPD) of ©Mintel that tracks consumer packaged goods launches in 86 markets across, 49.4% and 18.6% of the newly launched products from 2000 until 2020 were found in Europe and Asia.

The subgroup analysis indicates that the fruit &vegetable category has the highest WTP estimate while the seafood received the lowest one. The low WTP estimate of seafood (e.g., salmon) could be related to its price, which is more expensive than fruit & vegetable. It also could be related to the presence of many substitutes, which led to a lower price premium for these products particularly for consumers who were sensitive to price. As far as it concerns the high WTP value of fruit & vegetable, the main factors for high WTP mostly relied on a perceived increase in food safety and quality, especially for fresh and perishable products (Marchesini et al., 2007). Moreover, Moser et al. (2011) indicated that consumers perceived sustainable fruit & vegetable as being natural, with higher vitamin and nutrient content, and containing fewer or no pesticides and additives compared to conventional fruit & vegetable. The high WTP estimate for fruit & vegetable gives the producer and other stakeholders involved in the added-value chain of this category focus on promoting and advertising the sustainable aspects of the production systems that better attract consumers.

The increasing preference and acceptance of consumers for more sustainable food production systems is being answered by the increasing appearance of the circular farming approaches in the agricultural activities that include the principles of the circular economy. Conventional farming systems are adopting technologies, solutions, and practices that improve the use of nutrients, energy and water, reduce residues and emissions, recover nutrients from bio-waste ensuring a better match of the production with consumers' needs. However, the lowest WTP premium that consumers exhibited for sustainable seafood, and its potential association with the relatively high price by unit of sea products is clearly highlighting to decision-makers in the seafood sector the need to support reduction-cost strategies. These strategies could be applied along the different stakeholders along the added-value in order to encourage consumers to pay a suitable premium for more sustainable seafood products.

In addition, results show that organic food has the highest WTP estimate. This result is in line with the finding of Zander and Feucht (2018) who concluded that consumers' WTP for organic production as a sustainable attribute (14.8%) was higher than animal welfare (14.0%) and local (12.6%) attributes. Van Loo et al. (2015) also found that the WTP for organic food (27.0%) was the highest, followed by Rainforest Alliance (19.5%) and Fair-trade (15.8%) attributes. The relatively high WTP value for organic food products as a sustainable attribute compared to other attributes fit within the current increasing consumption level of organic food products. According to the results of the GNPD © Mintel, the newly launched food product with organic claim across 86 worldwide markets increased from 1970 newly launched organic food products in 2000 until 22.643 in 2020.

In fact, the high-interest level of consumers for organic attribute is accompanied by a continuous increase of organic production area. Producer marketing tools should be focused on increasing consumption level by improving the products' availability and consumers' access since there is a clearly high and positive WTP premium. According to the results, the organic attribute is preferred than the local one. Thus, retailers can use, and are using, this argument to first place and highlight organic items in hotlines in the shelves, specifically the fruit & vegetables category. Van Loo et al. (2011) pointed that a product label is a quality signal for the consumer. Thus, organic labels should be emphasized in front of other sustainable attributes to attract consumers. This outcome is highly important since it verifies the position of the organic attribute compared to local food descriptor. The result shows that the WTP estimate for local food is the smallest. As a result, it is necessary to increase consumers' knowledge about local food products and consider how to differentiate them in the market. Policymakers at the local level could give more support to local producers for potential adoption of organic farming practices which can add value by jointly producing organic and local food products.

Finally, there are some limitations in this research. While it is relevant to measure consumers' average WTP for sustainable food products, this study mostly focuses on the European countries because many of the previous studies are conducted in Europe. The numbers of research from other regions are not enough to draw a clear differentiation according to region, especially Oceania. In addition, fewer articles from 2020 and no articles from 2021 were included, so future meta-analysis research could include more articles from 2020 and 2021. Although heterogeneity exists in some data, meta-analysis is still useful for analyzing the data, which provides a more transparent assessment of the consistency of the effect compared to a simple summary of the literature (Clark et al., 2017). In order to improve policies for sustainable food products and obtained more evidence, the research scope and quantity of studies need to be expanded. With the emergence of related papers in the future, more comprehensive and representative papers will be collected for further research and will be better analyzed the WTP heterogeneity.

Reference:

Akgüngör, S., Miran, B., & Abay, C. (2010). Consumer willingness to pay for organic food in urban Turkey. *Journal of International Food and Agribusiness Marketing*, *22*(3), 299–313. https://doi.org/10.1080/08974431003641455

Amirnejad, H., & Tonakbar, P. (2015). *The Willingness to Pay for Organic Milk by Consumers in Tehran*. *17*, 1685–1694.

Aryal, K. P., Chaudhary, P., Pandit, S., & Sharma, G. (2009). Consumers' Willingness to Pay for Organic Products: A Case From Kathmandu Valley. *Journal of Agriculture and Environment*, *10*, 15–26. https://doi.org/10.3126/aej.v10i0.2126

Aye, M. S., Takahashi, Y., & Yabe, M. (2019). Effects of Consumer Preferences on Environmentally Friendly Tomatoes in Myanmar. *Journal of Agricultural Science*, *11*(13), 29. https://doi.org/10.5539/jas.v11n13p29

Barber, N., Taylor, C., & Strick, S. (2009). Wine consumers' environmental knowledge and attitudes: Influence on willingness to purchase. *International Journal of Wine Research*, *1*(1), 59–72. https://doi.org/10.2147/IJWR.S4649

Bellows, A. C., Onyango, B., Diamond, A., & Hallman, W. K. (2008). Understanding consumer interest in organics: Production values vs. purchasing behavior. In *Journal of Agricultural and Food Industrial Organization* (Vol. 6, Issue 1). https://doi.org/10.2202/1542-0485.1169

Berg, N., & Preston, K. L. (2017). Willingness to pay for local food?: Consumer preferences and shopping behavior at Otago Farmers Market. *Transportation Research Part A: Policy and Practice*, *103*, 343–361. https://doi.org/10.1016/j.tra.2017.07.001

Berghoef, N., & Dodds, R. (2011). Potential for sustainability eco-labeling in Ontario's wine industry. *The Eletronic Library*, *23*(4), 298–317.

Brklacich, M., Bryant, C. R., & Smit, B. (1991). Review and appraisal of concept of sustainable food production systems. *Environmental Management*, *15*(1), 1–14. https://doi.org/10.1007/BF02393834

Brugarolas Mollá-Bauzá, M. M., Martínez-Carrasco, L., Martínez-Poveda, A., & Rico Pérez, M. (2005). Determination of the surplus that consumers are willing to pay for an organic wine. *Spanish Journal of Agricultural Research*, *3*(1), 43. https://doi.org/10.5424/sjar/2005031-123

Cagalj, M., Haas, R., & Morawetz, U. B. (2016). Effects of quality claims on willingness to pay for organic food: Evidence from experimental auctions in Croatia. *British Food Journal*, *118*(9), 2218–2233. https://doi.org/10.1108/BFJ-11-2015-0453

Carley, S., & Yahng, L. (2018). Willingness-to-pay for sustainable beer. *PLoS ONE*, *13*(10), 1–18. https://doi.org/10.1371/journal.pone.0204917

Carpio, C. E., & Olga, I. M. (2008). Consumer willingness to pay for locally grown products: The case of South Carolina. *Agribusiness*. https://doi.org/10.1002/agr.20210

Chang, K. L., Xu, P., Underwood, K., Mayen, C., & Langelett, G. (2013). Consumers' Willingness to Pay for Locally Produced Ground Beef: A Case Study of the Rural Northern Great Plains. *Journal of International Food and Agribusiness Marketing*, *25*(1), 42–67.

https://doi.org/10.1080/08974438.2013.724002

Cicia, G., Del Giudice, T., Ramunno, I., & Tagliafierro, C. (2006). Splitting consumer's willingness to pay premium price for organic products over main purchase motivations. *98th EAAE\rSeminar Marketing Dynamics within the Global Trading System: New Perspectives.*, 13.

Clark, B., Stewart, G. B., Panzone, L. A., Kyriazakis, I., & Frewer, L. J. (2017). Citizens, consumers and farm animal welfare: A meta-analysis of willingness-to-pay studies. *Food Policy*, *68*, 112–127. https://doi.org/10.1016/j.foodpol.2017.01.006

Codron, J. M., Siriex, L., & Reardon, T. (2006). Social and environmental attributes of food products in an emerging mass market: Challenges of signaling and consumer perception, with European illustrations. *Agriculture and Human Values*, *23*(3), 283–297. https://doi.org/10.1007/s10460-006-9000-x

Corsi, A., & Novelli, S. (2002). Consumers' Willingness to Pay a Price for Organic Beef Meat. *Xth EAAE Congress 'Exploring Diversity in the European Agri-Food System*.

Darby, K., Batte, M., Ernst, S., & Roe, B. (2006). Willingness to pay for locally produced foods: A customer intercept study of direct market and grocery store shoppers. *American Agricultural Economic Association Annual Meeting*, 30.

De-Magistris, T., & Gracia, A. (2016). Consumers' willingness-to-pay for sustainable food products: The case of organically and locally grown almonds in Spain. *Journal of Cleaner Production*, *118*, 97–104. https://doi.org/10.1016/j.jclepro.2016.01.050

De Pelsmacker, P., Driesen, L., & Rayp, G. (2005). Do consumers Care about ethics? Willingness to pay for fair-trade coffee. *The Journal of Consumer Affairs*, *39*(2), 363–385. https://doi.org/10.1111/j.1745-6606.2005.00019.x

Denver, S., & Jensen, J. D. (2014). Consumer preferences for organically and locally produced apples. *Food Quality and Preference*, *31*(1), 129–134. https://doi.org/10.1016/j.foodqual.2013.08.014

Díaz, F. J. M., Pleite, F. M. C., Paz, J. M. M., & García, P. G. (2012). Consumer knowledge, consumption, and willingness to pay for organic tomatoes. *British Food Journal*, *114*(3), 318–334. https://doi.org/10.1108/00070701211213447

Dolgopolova, I., & Teuber, R. (2018). Consumers' willingness to pay for health benefits in food products: A meta-analysis. *Applied Economic Perspectives and Policy*, *40*(2), 333–352. https://doi.org/10.1093/aepp/ppx036

Drichoutis, A. C., Vassilopoulos, A., Lusk, J. L., & Nayga, R. M. (2017). Consumer preferences for fair labour certification. *European Review of Agricultural Economics*, *44*(3), 455–474. https://doi.org/10.1093/erae/jbx002

Everett, C., Jensen, K., Hughes, D., & Boyerd, C. (2017). Consumer Willingness to Pay for Local Wines and Shopping Outlet Preferences. *Journal of Food Distribution Research*, *48*(3), 31–50. http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=126691497&site=ehost-live

Fan, X., Gómez, M. I., & Coles, P. S. (2019). Willingness to Pay, Quality Perception, and Local Foods: The Case of Broccoli. *Agricultural and Resource Economics Review*, *48*(3), 414–432. https://doi.org/10.1017/age.2019.21

Forbes, S. L., Cohen, D. A., Cullen, R., Wratten, S. D., & Fountain, J. (2009). Consumer attitudes regarding environmentally sustainable wine: an exploratory study of the New Zealand marketplace. *Journal of Cleaner Production*, *17*(13), 1195–1199. https://doi.org/10.1016/j.jclepro.2009.04.008

Galati, A., Schifani, G., Crescimanno, M., & Migliore, G. (2019). "Natural wine" consumers and interest in label information: An analysis of willingness to pay in a new Italian wine market segment. *Journal of Cleaner Production*, *227*, 405–413. https://doi.org/10.1016/j.jclepro.2019.04.219

Gallenti, G., Troiano, S., Cosmina, M., & Marangon, F. (2016). Ethical and sustainable consumption in the Italian coffee market: a choice experiment to analyse consumers' willingness to pay. *Ethical and Sustainable Consumption in the Italian Coffee Market: A Choice Experiment to Analyse Consumers' Willingness to Pay*, *71*(2), 153–176. https://doi.org/10.13128/REA-20077

Gao, Z., Li, C., Bai, J., & Fu, J. (2016). Chinese consumer quality perception and preference of sustainable milk. *China Economic Review*, 100939. https://doi.org/10.1016/j.chieco.2016.05.004

Haghiri, M., Hobbs, J. E., & McNamara, M. L. (2009). Assessing consumer preferences for organically grown fresh fruit and vegetables in eastern New Brunswick. *International Food and Agribusiness Management Review*, *12*(4), 81–100.

Haghjou, M., Hayati, B., Pishbahar, E., & Mohammadrezaei, R. (2013). Factors Affecting Consumers' Potential Willingness to Pay for Organic Food Products in Iran: Case Study of Tabriz. *Agr. Sci. Tech.*, *15*, 191–202.

Hai, N. M., Moritaka, M., & Fukuda, S. (2013). Willingness to pay for organic vegetables in Vietnam: An empirical analysis in hanoi capital. *Journal of the Faculty of Agriculture, Kyushu University*, *58*(2), 449–458.

Howard, P. H., & Allen, P. (2008). Consumer willingness to pay for domestic 'fair trade': Evidence from the United States. *Renewable Agriculture and Food Systems*, *23*(3), 235–242. https://doi.org/10.1017/S1742170508002275

Hu, W., Woods, T., & Bastin, S. (2009). Consumer Acceptance and Willingness to Pay for Blueberry Products with Nonconventional Attributes. *Journal of Agricultural and Applied Economics*, *41*(1), 47–60. https://doi.org/10.1017/s1074070800002546

Isengildina-Massa, C. E. C. (2009). Consumer Willingness to Pay for Locally Grown Products: The Case of South Carolina. *Agribusiness*, *25*(3), 412–426. https://doi.org/10.1002/agr

Jin, J., He, R., Wang, W., & Gong, H. (2018). Valuing cultivated land protection: A contingent valuation and choice experiment study in China. *Land Use Policy*, *74*(December 2016), 214–219. https://doi.org/10.1016/j.landusepol.2017.09.023

Katt, F., & Meixner, O. (2020). A systematic review of drivers influencing consumer willingness to pay for organic food. *Trends in Food Science and Technology*, *100*, 374–388. https://doi.org/10.1016/j.tifs.2020.04.029

Kavoosi Kalashami, M., Sadeghpour, H., Allahyari, M. S., Surujlal, J., & Ghorbandoust, M. (2016). Evaluation of Urban Consumer Willingness to Pay for Organic Leafy Vegetables. *International Journal of Vegetable Science*, *23*(3), 195–206. https://doi.org/10.1080/19315260.2016.1230166

Krystallis, A., Fotopoulos, C., & Zotos, Y. (2006). Organic Consumers' Profile and Their Willingness to Pay (WTP) for Selected Organic Food Products in Greece. *Journal of International Consumer Marketing*, *19*(1), 37–41. https://doi.org/10.1300/J046v19n01

Kucher, A., Heldak, M., Kucher, L., Fedorchenko, O., & Yurchenko, Y. (2019). Consumer willingness to pay a price premium for ecological goods: A case study from Ukraine. *Environmental and Socio-Economic Studies*, *7*(1), 38–49. https://doi.org/10.2478/environ-2019-0004

Lagerkvist, C. J., & Hess, S. (2011). A meta-analysis of consumer willingness to pay for farm animal welfare. *European Review of Agricultural Economics*, *38*(1), 55–78. https://doi.org/10.1093/erae/jbq043

Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, *18*(6), 503–520. https://doi.org/10.1108/EUM0000000006155

List, J. A., & Gallet, C. A. (2001). What experimental protocol influence disparities between actual and hypothetical stated values? *Environmental and Resource Economics*, *20*(3), 241–254.

Liu, C. C., Chen, C. W., & Chen, H. S. (2019). Measuring consumer preferences and willingness to pay for coffee certification labels in Taiwan. *Sustainability (Switzerland)*, *11*(5), 1–13. https://doi.org/10.3390/su11051297

Liu, X., Wang, C., Shishime, T., & Fujitsuka, T. (2010). Sustainable consumption: Green purchasing behaviours of urban residents in China. *Sustainable Development*, *20*(4), 293–308. https://doi.org/10.1002/sd.484

Loureiro, M. L. (2003). Rethinking new wines: Implications of local and environmentally friendly labels. *Food Policy*, *28*(5–6), 547–560. https://doi.org/10.1016/j.foodpol.2003.10.004

Loureiro, M. L., & Hine, S. (2002). Discovering Niche Markets : A Comparison of Consumer Willingness to Pay for Local (Colorado Grown), Organic , and GMO-Free Products. *Journal of Agricultural and Applied Economics*, *3*, 477–487.

Martínez-Carrasco, L., Brugarolas, M., Martínez-Poveda, A., & Ruiz-Martínez, J. J. (2015). Comparing hypothetical versus non-hypothetical methods for measuring willingness to pay in a food context. *Spanish Journal of Agricultural Research*, *13*(4). https://doi.org/10.5424/sjar/2015134-8233

Miranda-de la Lama, G. C., Estévez-Moreno, L. X., Sepúlveda, W. S., Estrada-Chavero, M. C., Rayas-Amor, A. A., Villarroel, M., & María, G. A. (2017). Mexican consumers' perceptions and attitudes towards farm animal welfare and willingness to pay for welfare friendly meat products. *Meat Science*, *125*, 106–113. https://doi.org/10.1016/j.meatsci.2016.12.001

Moser, R., Raffaelli, R., & Thilmany-McFadden, D. (2011). Consumer preferences for fruit and vegetables with credence-based attributes: A review. *International Food and Agribusiness Management Review*, *14*(2), 121–142. https://doi.org/10.22004/ag.econ.103990

Mugera, A., Burton, M., & Downsborough, E. (2016). Consumer Preference and Willingness to Pay for a Local Label Attribute in Western Australian Fresh and Processed Food Products. *Journal of Food Products Marketing*, *23*(4), 452–472. https://doi.org/10.1080/10454446.2015.1048019

Napolitano, F., Braghieri, A., Piasentier, E., Favotto, S., Naspetti, S., & Zanoli, R. (2010). Cheese liking and consumer willingness to pay as affected by information about organic production. *Journal of Dairy Research*, *77*(3), 280–286. https://doi.org/10.1017/S0022029910000130

Ogbeide, O. A., Ford, C., & Stringer, R. (2015). The Environmental Benefits of Organic Wine: Exploring Consumer Willingness-to-Pay Premiums? *Journal of Food Products Marketing*, *21*(5), 482–502. https://doi.org/10.1080/10454446.2013.856054

Piyasiri, A., & Ariyawardana, A. (2002). Market Potentials and Willingness to Pay for Selected Organic Vegetables in Kandy. *Sri Lankan Journal of Agricultural Economics*, *4*(0), 107–119. https://doi.org/10.4038/sjae.v4i0.3486

Rotaris, L., & Danielis, R. (2011). Willingness to pay for fair trade coffee: A conjoint analysis experiment with Italian consumers. *Journal of Agricultural & Food Industrial Organization*. https://doi.org/10.2202/1542-0485.1305

Rothstein, H. R., Sutton, A. J., & Borenstein, M. (2006). Publication Bias in Meta-Analysis. *Publication Bias in Meta-Analysis: Prevention, Assessment and Adjustments*, 1–7.

https://doi.org/10.1002/0470870168.ch1

Rousseau, S., & Vranken, L. (2011). *The Impact of Information on the Willingness-to-Pay for Labeled Organic Food Products Paper prepared for presentation at the EAAE 2011 Congress Change and Uncertainty Challenges for Agriculture, Food and Natural Resources The Impact of Information on the* . http://ageconsearch.umn.edu/bitstream/115986/2/Rousseau_Sandra_191.pdf

Salladarré, F., Brécard, D., Lucas, S., & Ollivier, P. (2016). Are French consumers ready to pay a premium for eco-labeled seafood products? A contingent valuation estimation with heterogeneous anchoring. *Agricultural Economics (United Kingdom)*, *47*(2), 247–258. https://doi.org/10.1111/agec.12226

Sans, P., & Sanjuán-López, A. I. (2015). Beef animal welfare, Attitudes and Willingness to Pay: A regional comparison across the Pyrenees. *Spanish Journal of Agricultural Research*, *13*(3). https://doi.org/10.5424/sjar/2015133-7273

Sarma, P., & Raha, S. (2016). Consumers willingness to pay for organic beef: Evidence from Dhaka City. *Journal of the Bangladesh Agricultural University*, *14*(1), 83–91. https://doi.org/10.3329/jbau.v14i1.30602

Schäufele, I., & Hamm, U. (2017). Consumers' perceptions, preferences and willingness-to-pay for wine with sustainability characteristics: A review. *Journal of Cleaner Production*, *147*, 379–394. https://doi.org/10.1016/j.jclepro.2017.01.118

Schollenberg, L. (2012). Estimating the hedonic price for Fair Trade coffee in Sweden. *British Food Journal*, *114*(3), 428–446. https://doi.org/10.1108/00070701211213519

Schott, L., & Bernard, J. C. (2015). Comparing Consumer's Willingness to Pay for Conventional, Non-Certified Organic and Organic Milk from Small and Large Farms. *Journal of Food Distribution Research*, *46*(3), 1–20.

Sellers-Rubio, R., & Nicolau-Gonzalbez, J. L. (2016). Estimating the willingness to pay for a sustainable wine using a Heckit model. *Wine Economics and Policy*, *5*(2), 96–104. https://doi.org/10.1016/j.wep.2016.09.002

Sellers, R. (2016). Would you Pay a Price Premium for a Sustainable Wine? The Voice of the Spanish Consumer. *Agriculture and Agricultural Science Procedia*, *8*, 10–16. https://doi.org/10.1016/j.aaspro.2016.02.003

Skreli, E., Imami, D., Chan, C., Canavari, M., Zhllima, E., & Pire, E. (2017). Assessing consumer preferences and willingness to pay for organic tomatoes in Albania: A conjoint choice experiment study. *Spanish Journal of Agricultural Research*, *15*(3). https://doi.org/10.5424/sjar/2017153-9889

Smed, S. (2005). Demand structure and Willingness to pay for organic dairy products. *Cahiers Options Méditerranéennes*, *64*, 33–44. http://www.abhatoo.net.ma/index.php/fre/content/download/8943/133156/file/Demand_Structure_and_Willingness_to_Pay_for_Organic_Dairy_Products.pdf

Solgaard, H. S., & Yang, Y. (2011). Consumers' perception of farmed fish and willingness to pay for fish welfare. *British Food Journal*, *113*(8), 997–1010. https://doi.org/10.1108/00070701111153751

Stanley. (2011). Beyond publication bias. *Journal of Clinical Epidemiology*, *64*(5), 459–462. https://doi.org/10.1016/j.jclinepi.2010.09.003

Tait, P. R., Saunders, C., & Guenther, M. (2015). Valuing Preferences for Environmental Sustainability in Fruit Production by United Kingdom and Japanese Consumers. *Journal of Food*

Research, *4*(3), 46. https://doi.org/10.5539/jfr.v4n3p46

Tait, P., Saunders, C., Guenther, M., & Rutherford, P. (2016). Emerging versus developed economy consumer willingness to pay for environmentally sustainable food production: A choice experiment approach comparing Indian, Chinese and United Kingdom lamb consumers. *Journal of Cleaner Production*, *124*, 65–72. https://doi.org/10.1016/j.jclepro.2016.02.088

Tully, S. M. ., & Winer, R. S. (2014). The role of the beneficiary in willingness to pay for socially responsible products: A meta-analysis. *Journal of Retailing*, *90*(2), 255–274. https://doi.org/10.1016/j.jretai.2014.03.004

Uchida, H., Roheim, C. A., Wakamatsu, H., & Anderson, C. M. (2014). Do Japanese consumers care about sustainable fisheries? Evidence from an auction of ecolabelled seafood. *Australian Journal of Agricultural and Resource Economics*, *58*(2), 263–280. https://doi.org/10.1111/1467-8489.12036

Van Loo, E. J., Caputo, V., Nayga, R. M., Meullenet, J. F., & Ricke, S. C. (2011). Consumers' willingness to pay for organic chicken breast: Evidence from choice experiment. *Food Quality and Preference*, *22*(7), 603–613. https://doi.org/10.1016/j.foodqual.2011.02.003

Van Loo, E. J., Caputo, V., Nayga, R. M., Seo, H. S., Zhang, B., & Verbeke, W. (2015). Sustainability labels on coffee: Consumer preferences, willingness-to-pay and visual attention to attributes. *Ecological Economics*, *118*, 215–225. https://doi.org/10.1016/j.ecolecon.2015.07.011

Van Loo, E. J., Caputo, V., Nayga, R. M., & Verbeke, W. (2014). Consumers' valuation of sustainability labels on meat. *Food Policy*, *49*(P1), 137–150. https://doi.org/10.1016/j.foodpol.2014.07.002

Van Loo, E. J., Diem, M. N. H., Pieniak, Z., & Verbeke, W. (2013). Consumer attitudes, knowledge, and consumption of organic yogurt. *Journal of Dairy Science*, *96*(4), 2118–2129. https://doi.org/10.3168/jds.2012-6262

Van Osch, S., Hynes, S., O'Higgins, T., Hanley, N., Campbell, D., & Freeman, S. (2017). Estimating the Irish public's willingness to pay for more sustainable salmon produced by integrated multi-trophic aquaculture. *Marine Policy*, *84*(March), 220–227. https://doi.org/10.1016/j.marpol.2017.07.005

Vanhonacker, F., Van Loo, E. J., Gellynck, X., & Verbeke, W. (2013). Flemish consumer attitudes towards more sustainable food choices. *Appetite*, *62*, 7–16. https://doi.org/10.1016/j.appet.2012.11.003

Vecchio, R. (2013). Determinants of willingness-to-pay for sustainable wine: Evidence from experimental auctions. *Wine Economics and Policy*, *2*(2), 85–92. https://doi.org/10.1016/j.wep.2013.11.002

Vecchio, R., & Annunziata, A. (2015). Willingness-to-pay for sustainability-labelled chocolate: An experimental auction approach. *Journal of Cleaner Production*, *86*, 335–342. https://doi.org/10.1016/j.jclepro.2014.08.006

Vitale, S., Biondo, F., Giosuè, C., Bono, G., Okpala, C. O. R., Piazza, I., Sprovieri, M., & Pipitone, V. (2020). Consumers' perception and willingness to pay for eco-labeled seafood in Italian hypermarkets. *Sustainability (Switzerland)*, *12*(4), 1–13. https://doi.org/10.3390/su12041434

Wang, L., & Huo, X. (2016). Willingness-to-pay price premiums for certified fruits -A case of fresh apples in China. *Food Control*, *64*, 240–246. https://doi.org/10.1016/j.foodcont.2016.01.005

Wolf, C. A., & Tonsor, G. T. (2017). Cow Welfare in the U.S. Dairy Industry: Willingness-to-Pay and Willingness-to-Supply. *Western Agricultural Economics Association*, *42*(2), 164–179.

Xia, W., & Zeng, Y. (2006). Consumer's Attitudes and Willingness-to-Pay for Green Food in Beijing. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2281861

Xia, W., & Zeng, Y. (2008). Consumer's Willingness to Pay for Organic Food in the Perspective of Meta-Analysis. *International Conference on Applied Economics*, 933–943. https://doi.org/10.2139/ssrn.1288047

Xu, P., Zeng, Y., Fong, Q., Lone, T., & Liu, Y. (2012). Chinese consumers' willingness to pay for green- and eco-labeled seafood. *Food Control*, *28*(1), 74–82. https://doi.org/10.1016/j.foodcont.2012.04.008

Yang, S.-H., Hu, W., Mupandawana, M., & Liu, Y. (2012). Consumer Willingness to Pay for Fair Trade Coffee: A Chinese Case Study. *Journal of Agricultural and Applied Economics*, *44*(1), 21–34. https://doi.org/10.1017/s1074070800000146

Yang, S. H., Qing, P., Hu, W., & Liu, Y. (2013). Using a Modified Payment Card Survey to Measure Chinese Consumers' Willingness to Pay for Fair Trade Coffee: Considering Starting Points. *Canadian Journal of Agricultural Economics*, *61*(1), 119–139. https://doi.org/10.1111/j.1744-7976.2012.01266.x

Yang, Y. C. (2018). Factors affecting consumers' willingness to pay for animal welfare eggs in Taiwan. *International Food and Agribusiness Management Review*, *21*(6), 741–754. https://doi.org/10.22434/IFAMR2017.0072

Yaowarat, S., Gan, C., Lee, M., & Cohen, D. A. (2015). Consumers' willingness to pay for organic products in Thailand. *International Journal of Social Economics*, *42*(5), 480–510.

Yi, S. (2019). Willingness-to-Pay for sustainable aquaculture products: Evidence from Korean red seabream aquaculture. *Sustainability (Switzerland)*, *11*(6), 1577. https://doi.org/10.3390/su11061577

Yip, W., Knowler, D., & Haider, W. (2012). *Assessing the willingness to pay for more sustainably farmed Atlantic salmon in the Pacific Northwest : combining discrete choice experiment and latent class analysis*. 1–34.

Yooyen, A., & Leerattanakorn, N. (2012). Discovering Niche Market: Consumer Preferences and Willingness to Pay for Organic Pork. *Psikologi Perkembangan*, *11*(3), 251–264. https://doi.org/10.1017/CBO9781107415324.004

Zander, K., & Feucht, Y. (2018). Consumers' Willingness to Pay for Sustainable Seafood Made in Europe. *Journal of International Food and Agribusiness Marketing*, *30*(3), 251–275. https://doi.org/10.1080/08974438.2017.1413611

Annex 1

Characteristics of the studies included in the research

No.	Study	Country	Sample	Food products	Method	Sustainable attributes	Annual Income ($)	university	age	female
1	Denver and Jensen (2014)	Denmark	637	Apples	CE	organic		0.19	41	0.52
2	Loureiro (2003)	U.S. A	406	Wine	CVM	EF	50000-70000		41	0.43
3	Vecchio (2013)	Italy	80	Wine	Bid functions	EF		1.00	23	0.60
4	De-Magistris and Gracia（2016)	Spain	171	Almonds	Non-hypothetical CE	local	31670	0.37	46	0.52
5	Vecchio and Annunziata (2015)	Italy	80	Chocolate	BDM auction	EF		0.53	25	0.56
6	Xu et al. (2012)	China	386	Seafood	Face-to-face interviews	EF	8257	0.60		0.61
7	Gao et al. (2016)	China	307	Milk	CVM	EF	21714	0.49	27	0.59
8	Forbes et al. (2009)	New Zealand	109	Wine	CE	EF		0.41		0.64
9	De Pelsmacker et al. (2005)	Belgium	808	Coffee	CE	fair-trade		0.84	31	0.54
10	Olesen et al. (2010)	Norway	115	Salmon	Non-hypothetical CE	organic	61339		39	0.58
11	Van Osch et al.（2017)	Ireland	500	Salmon	CE	EF		0.45	42	0.56
12	Aye, Takahashi, and Yabe (2019)	Myanmar	332	Tomatoes	CE	EF	10667-53333		40	0.86
13	Vanhonacker et al. (2013)	Belgium	221	Meat alternatives	Online survey	EF		0.78	41	0.64
14	Van Loo et al. (2011)	U.S. A	976	chicken breast	CE	organic	48230	0.61	39	0.73
15	Skreli et al. (2017)	Albania	220	Tomatoes	CE	organic			46	0.53
16	Tait et al. (2016)	China, India, UK	2067	Lamb meat	CE & CVM	EF		0.38	39	0.44
17	Zander and Feucht (2018)	8 European countries	4103	Seafood	CVM	EF		0.38	44	0.65
18	Van Loo et al.（2015)	U.S. A	81	Coffee	CE	EF	43600	0.66	36	0.53
19	Isengildina-Massa (2009)	U.S. A	500	Meat	CVM	local				0.51
20	Howard and Allen (2008)	U.S. A	476	Strawberry	CE	fair-trade	44137	0.70	52	0.54
21	Akgüngör et al. (2010)	Turkey	202	Fruit & vegetable	CVM	organic	11091	0.15	36	0.75
22	Miranda-de la Lama et al. (2017)	Mexico	843	Meat	interviews	animal welfare		0.30	39	0.56
23	Chang et al. (2013)	U.S. A	103	Beef	CE	local	49875	0.81	36	0.78
24	Darby et al. (2006)	U.S. A	530	Strawberry	CE	local	81891	0.78	50	0.72

25	Gallenti et al. (2016)	Italy	420	Coffee	CE	fair-trade		0.32	47	0.62
26	Makdisi and Marggraf (2011)	German	300	Broiler	CVM	animal welfare	15482	0.31	34	0.50
27	Van Loo et al. (2014)	Belgium	359	chicken breast	CE	animal welfare		0.29	43	0.60
28	Sans and Sanjuán-López (2015)	Spain, France	1213	Beef	CVM	animal welfare		0.35	38	0.54
29	Sarma and Raha (2016)	Bangladesh	180	Beef	questionnaires	organic				
30	Ogbeide et al. (2015)	Australia	2099	Wine	CVM	organic	66625	0.40	49	0.39
31	S.H. Yang et al. (2012)	China	564	Coffee	face-to-face survey	fair-trade	9872		24	0.61
32	Van Loo et al. (2013)	Belgium	774	Yogurt	cross-sectional survey	organic		0.31	42	0.62
33	Yaowarat et al. (2015)	Thailand	502	kale, rice, pork	CVM	organic	20492	0.80	41	0.79
34	Kavoosi Kalashami et al. (2016)	Iran	269	Vegetable	CVM	organic	3743	0.47	43	0.22
35	Sellers-Rubio et al. (2016)	Spain	553	Wine	CVM	EF	17512		33	0.37
36	Carley and Yahng (2018)	U.S. A	1094	Beer	Online survey	EF	37300	0.54	35	0.43
37	Smed (2005)	Denmark	2000	Dairy	panel study	organic				
38	Wolf and Tonsor (2017)	U.S. A	2001	Dairy	CE	animal welfare	43625	0.34	51	0.7
39	Cicia et al. (2006)	Italy	248	Tomato	CE	organic				
40	Napolitano et al. (2010)	Italy	150	Cheese	Auction	organic		0.43	48	0.56
41	Hu, Woods, and Bastin (2009)	U.S. A	557	Strawberry	CE	organic	52926		43	0.67
42	Haghjou et al. (2013)	Iran	423	Food	CVM	organic	1523		41	0.46
43	Liu, Chen, and Chen (2019)	Taiwan, China	568	Coffee	CE	fair-trade	6864	0.72	44	0.48
44	Schollenberg (2012)	Sweden	214	Coffee	Panel study	fair-trade				
45	Vitale et al. (2020)	Italy	560	Seafood	face-to-face survey	EF	23609		49	0.51
46	Schott and Bernard (2015)	U.S. A	128	Milk	Experimental auctions	organic	61875		39	0.57
47	Drichoutis et al. (2017)	Greece	3800	Strawberry	CVM	fair-trade		0.69	40	0.66
48	Salladarré et al. (2016)	France	626	Seafood	CVM	EF				
49	Yooyen et al. (2012)	Thailand	400	Pork	CVM	organic	9897	0.43	47	0.56
50	Haghiri et al. (2009)	Canada	141	Fruit & vegetable	face-to-face survey	organic	42482	0.4	41	0.44
51	Amirnejad and Tonakbar (2015)	Iran	450	Milk	CVM	organic	2525		30	0.57
52	Hai et al. (2013)	Vietnam	185	Vegetables	CVM	organic	5791	0.68	35	0.75

53	Güney and Giraldo (2019)	Turkey	552	Egg	CE	organic	772	0.25	39	0.57
54	Uchida et al. (2014)	Japan	160	Salmon	auction experiment	EF	59004		50	0.96
55	Aryal et al. (2009)	Nepal	180	Products	questionnaires	organic				
56	Rousseau and Vranken (2011)	Belgium	226	Apple	CE	organic	42439	0.78	42	0.62
57	Berghoef and Dodds (2011)	Canada	401	Wine	questionnaires	EF	79100	0.35	44	0.52
58	Kucher et al. (2019)	Ukraine	60	Product	questionnaires	EF		0.30	35	0.55
59	Cagalj et al. (2016)	Croatia	258	Apples	auction experiment	organic	14021	0.53	36	0.51
60	Galati et al. (2019)	Italy	262	Wine	CE	EF	29818	0.33		
61	Yi (2019)	Korea	1000	Aquaculture	CVM	EF	51616	0.64	44	0.50
62	Yip, Knowler, and Haider (2012)	Canada	1631	Aquaculture	CE	EF				
63	Xia and Zeng (2006)	China	300	Milk	CVM	EF		0.64	28	0.51
64	Berg and Preston (2017)	New Zealand	114	Product	interview	local			47	0.63
65	Mugera et al. (2016)	Australia	333	Breast	CE	local	59316	0.51	33	0.69
66	Everett et al. (2017)	U.S. A	458	Wine	CE	local	58390	0.38	40	0.73
67	Fan et al. (2019)	U.S. A	80	Broccoli	BDM auction	local	48550	0.34	49	0.73
68	Loureiro et al. (2002)	Portland	285	Apple	in-store survey	EF	60000	0.63	46	0.79
69	Gil Roig et al. (2000)	Spain	800	Product	CVM	organic			42	0.55
70	Solgaard and Yang (2011)	Denmark	1000	Fish	CVM	animal welfare	70316	0.51	44	0.51
71	Carpio and Olga (2008)	U.S. A	500	Meat	CVM	local	57400		58	0.52
72	Barber et al. (2009)	U.S. A	820	Wine	questionnaires	EF	83800	0.79	45	0.49
73	Brugarolas et al. (2005)	Spain	400	Wine	CVM	organic	21711	0.36	41	0.52
74	S. H. Yang et al. (2013)	China	564	Coffee	face-to-face survey	fair-trade	10284		24	0.40
75	Corsi and Novelli (2002)	Spain	402	Beef	CVM	organic	21464		50	0.82
76	Díaz et al. (2012)	Spain	361	Tomato	CVM	organic	32747	0.62	39	0.65
77	Piyasiri et al. (2002)	Sri Lanka	90	Vegetables	questionnaires	organic	2169		41	
78	Rotaris and Danielis (2011)	Italy	135	Coffee	CE	fair-trade		0.31	47	0.89
79	George (2010)	Dominica	200	Fruit & vegetable	CVM	local	10433	0.60	36	0.56
80	Loureiro and Hine (2002)	U.S. A	437	Potato	CVM	local	50000		44	0.60