Investigation note

Willingness to pay for organic products in Texcoco, State of Mexico

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Abstract

The objective of the study was to estimate the willingness to pay (DAP) for organic products in Texcoco, State of Mexico, as well as determine the socioeconomic variables that most influence the DAP of people for organic products, under the hypothesis that there is a DAP positive among the participants. 130 surveys were applied in the municipality of Texcoco, State of Mexico in the period from January 1 to March 31, 2017. The DAP was estimated for organic products in the area, using the contingent valuation method and a Logit Binomial model, using the Nlogit software, the variables that explain the DAP are price, gender, age, marital status, level of education and income, concluding that the inhabitants of the study area are willing to pay an extra amount in the price of basic products (lettuce, tomato and rice) if they are produced organically. In the case of lettuce, a DAP of 7.50 $ piece was determined, for tomato 11.00 $ kg and for rice 32.5 $ kg, which represents 53%, 41.5% and 2228% respectively.

Keywords: contingent valuation, DAP, logit-binomial model.

Reception date: August 2019
Acceptance date: September 2019

In Mexico, the willingness to pay (DAP) for organic food is reduced, compared to conventional products. In the State of Mexico, the general knowledge of the population regarding the offer (location and quantity), benefits and prices of organic agricultural products is diverse, there are some municipalities with zero or almost zero knowledge and others such as the municipality of Texcoco that have a level of knowledge above average with respect to the situation of organic agricultural products at the local level.

The high level of information in the area on organic products is important since it has been shown that the proximity of the individual surveyed with the good that is being valued determines the expressed DAP. From this point of view 'for the DAP to be valid, respondents are required to be familiar with the well evaluated, so it must be ensured that respondents have complete information. Perception can be influenced as respondents learn from information in the contingent market' (Blomquist and Whitehead, 1998).

The objective of this research was to determine if the population living in the study area is willing to pay a higher price for consuming organic products, estimate the additional amount to be paid and determine the socioeconomic variables that influence the DAP for organic products. Vázquez (2012) conducted an investigation on the willingness to pay for organic products in Xalapa Veracruz, in a local market he found that the consumption of organic products is due to health benefits (86%), environmental concern (31%), flavor (26%), freshness (20%) and not having agrochemical residues (3%).

The 69% expressed a positive DAP at up to 40% overprice. Similarly, in Cerda *et al*. (2014) DAP was determined for organic apples in the Santiago region of Chile, obtaining that there is a positive willingness to pay up to 30% of the price of conventional apples. The main hypotheses of the study are that people who live in the study area are willing to pay an extra amount for basic foods if they are produced organically and that socioeconomic variables such as gender, age, marital status, level of education and income, explain the willingness to pay for organic products.

Abdul *et al*. (2007), obtained that the educational level of women compared to that of men, has a more significant effect on DAP due to organic products, Jaramillo *et al*. (2015) state that the characteristics, schooling, household income, knowledge about organic food, and the safety attribute are significant of the DAP. This reveals the importance of the level of income and formal education in the consumer's decision about the possible price premium for these foods.

About this approach Jaramillo *et al*. (2019), they found that 90% of respondents are willing to pay an extra amount for organic products and that the variables that most influence is the level of schooling, family income and the perception of quality.

On the other hand, Salgado and Beltran (2011), conclude that the main factors that influence the consumption of organic products are marketing or marketing strategies, price, demographic aspects, schooling and health concerns. The positive perception of organic products with respect to health is consistent with recent studies such as that of Márquez *et al*. (2019) where it is claimed that organic products are healthy and non-toxic, promoting physical well-being.

The methodology used in this research was the contingent valuation that consists essentially in the application of surveys aimed at determining the degree of valuation expressed by respondents to a good or service and the variables that determine it. Considering the use of the referendum type format, in this study the variable dependent on the model is the utility of the individual (U) and the independent variables are the consumption of organic products (Q), income (Y) and a vector of variables (level educational, age, sex and marital status) socioeconomic (S), that is: U= f (Q, Y, S).

Thus, the initial utility of the individuals surveyed (U_0), which corresponds to a state of non-consumption of organic products (Q_0), can be improved up to (U_1); through the consumption of organic products (Q_1) for which they must pay an additional amount (P) that comes from their disposable income (Y). Thus, 'if the user agrees to pay an amount of money' 'P' to maintain the proposed scenario, it must be fulfilled that: V1(Q= 1, Y- P; S)-V0(Q= 0, Y; S)> e_0-e_1. Where the terms e_0 and e_1 assume independent and identically distributed random variables.

The change in utility experienced by the user will be equal to the difference between the final utility function minus the initial one, to access the utility in the final situation defined by the proposed scenario, a certain amount of money proposed by the interviewer must be paid (Tudela, 2011).

The general logistic model is expressed:

$$Prob(Si)=Prob(V_1-V_0>\eta)=prob(\alpha_0-\beta P+\alpha S)>\eta)=\frac{1}{1+exp^{(-\alpha_0+\beta P+\alpha S)}}$$

The logistic model of the following binomial type is proposed:

$$Prob(SI)=\alpha_0+\beta\,(price)+\alpha_1\,(gender)+\alpha_2\,(age)+\alpha_3\,(marital\ status)+\alpha_4\,(level\ of\ studies)+\alpha_5\,(income)+\varepsilon_t$$

Where: the variables: Prob (SI), represents the probability that you are willing to pay an extra amount in the price of commodities, for having been produced organically, the variable price refers to the proposed price to pay for the consumption of organic products, gender indicates the sex of the interviewee (male or female), age represents the age of the interviewee, marital status refers to the marital status of the interviewee (single or married), level of studies represents the level of studies held by the interviewed and the income variable indicates the monthly amount of money available to the respondent's family.

130 surveys were applied under a random sampling scheme with infinite population, considering 3 different products (lettuce, tomato and rice) in 5 price levels. So, 5 survey formats were generated (one for each price level) applying 26 surveys of each format. For this study, the surveys were made up of 4 parts: a) the first on the respondent's knowledge about organic products; b) the second part was of perception on organic products; c) the third part on the willingness to pay; and d) the fourth on socioeconomic characteristics.

The prices used for each product are reported in Table 1.

Table 1. Price levels used in the survey formats[*].

Product	Market price[**]	Price 1	Price 2	Price 3[***]	Price	Price 5
Lettuce ($ pieza^{-1})	14	16	17	19	21	22
Tomato ($ kg^{-1})	26.5	29	32	35	37	40
Rice ($ kg^{-1})	14	27	39	52	65	77

[*]= prices published on the official pages of Walmart, Soriana and Sam's Club supermarkets. (January 2017); [**]= conventional product price in the market; [***]= organic product price in the market.

This structure of price levels studies a smaller margin in the current prices of organic products, which allows to analyze if a lower price would generate an increase in the amount of people willing to pay that compensates for the decrease in prices in terms of income for sellers of organic products, in turn, it explores an amount higher than the current price of organic products in order to see if the people who currently consume them are willing to pay a higher price than the current one.

The 44% of the interviewees were men and 66% women. The average age was 37 years. 41% said they were single. The average level of education is preparatory. The average income was $4 000.00 - $8 000.00. Of the total, only 10% consume organic, while 55% know them and 32% distinguish them from conventional products, only 25% know where to buy them and 50% consider them beneficial for health and the environment. 33% presented a negative DAP and 77% positive.

The consumption limitations in the study area are mainly a high lack of knowledge regarding points of sale and a marked segmentation of the population with respect to the general knowledge of what organic products are and how they differ from conventional products, which is consistent with what Salgado and Beltran (2011) found, who state that marketing has a determining influence on the purchase of organic products.

In the interview 50% of those who expressed a positive DAP was because they do not contain chemicals and are beneficial for health, 30% because they are high quality products and 10% due to environmental concerns. This is consistent with that obtained by Voon *et al*. (2011), where it is expressed that health and environmental concerns influence consumer acceptance towards organic foods, also in Jaramillo *et al*. (2015) states that the reasons to prefer organic are for health and social responsibility.

On the other hand, 75% of those interviewed with negative DAP commented that it was due to not knowing where to buy them, less than 1% stated that it was because they were not interested in consuming them and 85% said that it was due to the high prices with respect to conventional products, from which it is concluded that high prices are the main limitation for their consumption. This result coincides with those obtained by Padilla *et al*. (2007), who determined that the prices of organic products reduce their market to elitist areas of greater purchasing power.

In addition to the above, the uncertainty regarding whether the products sold as organic are really of organic origin (certification), is a limitation to affirm that they are beneficial for health and that they do not contain chemicals, according to the opinions of the respondents. As Lacaze (2009) puts it, there is a desire to find the information available on the packages and labels of the chosen foods that prove their origin.

The results of the coefficients for the model of each product are shown in Tables 2, 3 and 4.

Table 2. Rice model.

Variable	Coefficient	E. Standard	b/St. Er	P[(Z)>z]
Constant	-4.2071	1.75831076	-2.393	0.0167
Price	-0.0523	0.02334285	-2.243	0.0249
Gender	-0.3221	0.68169391	-0.473	0.6365
Age	0.0718	0.02868522	2.506	0.0122
Marital status	1.0932	0.80939013	1.351	0.1768
Level of studies	0.2141	0.37930253	0.564	0.5724
Income	0.6643	0.36330519	1.829	0.0675

The final model for rice (Table 2) would be DAPA= -4.2 -0.05 price -0.32 gender + 0.07 age + 1.09 marital status + 0.21 level of studies + 0.66 income.

Table 3. Tomato model.

Variable	Coefficient	Error standard	b/St. Er	P[(Z)>z]
Constant	-2.09206982	1.16867435	-1.79	0.0734
Price	-0.33778164	0.10574945	-3.194	0.0014
Gender	-1.71499977	0.72379032	-2.369	0.0178
Age	0.07817159	0.02727343	2.866	0.0042
Marital status	1.24756476	0.77312792	1.614	0.1066
Level of studies	0.39016214	0.29034999	1.344	0.179
Income	0.28335718	0.19812036	1.43	0.1527

The final model for tomato (Table 3) would be DAPJ= -2.09 -0.33 price -1.7 gender + 0.07 age + 1.24 marital status + 0.39 level of studies + 0.28 income.

Table 4. Lettuce model.

Variable	Coefficient	E. Standard	b/St. Er	P[(Z)>z]
Constant	-3.92173998	1.98493099	-1.976	0.0482
Price	-0.40404115	0.18404744	-2.195	0.0281
Gender	-0.63564728	0.76966052	-0.826	0.4089
Age	0.09236042	0.04276384	2.16	0.0308
Marital status	-0.49934003	0.83074543	-0.601	0.5478
Level of studies	0.86389337	0.44325052	1.949	0.0513
Income	0.67132713	0.38869222	1.727	0.0841

The final model for lettuce (Table 4) would be DAPL= -3.9 -0.4 price -0.63 gender + 0.09 age - 0.49 marital status + 0.86 level of studies + 0.67 income.

With respect to the willingness to pay, according to Hanemann, M. (1984), the DAP is estimated as follows:

$$DAP=-\frac{\alpha_0+\alpha_2 GENDER+\alpha_3 AGE+\alpha_4 MARITAL\ STATUS+\alpha_5 LEVEL\ OF\ STUDIES+\alpha_6 INCOME}{\beta_1 PRICE}$$

People in the study area are willing to pay an additional $7.50 pesos to the market price of conventional lettuce for organic lettuce, which is an additional 53.6%, with a standard deviation of 3.2, a minimum value of $0.80 and a maximum of $9.90. In the case of the tomato, an average DAP of an additional $11.00 per one kilogram of organic tomato was obtained, which is an additional 41.5%, with a standard deviation of 6.11, a minimum of $0.48 and a maximum value of $19.88. Finally, with respect to rice, the average willingness to pay is an additional $32.00 per one kilogram of organic rice, which represents an additional 228%, with a standard deviation of 22.7, a minimum value of $ 3.75 and a maximum of $78.50.

Conclusions

77% of the sample are willing to pay an additional amount for organic products. The additional amount with respect to the market price of conventional product that they are willing to pay are for lettuce 53.6%, for tomatoes 41.5% and for rice 22.8%, in all cases it is less than the market price of organic products.

On the other hand, the variables that explain or influence the willingness to pay for organic products are the price and the sociodemographic variables, income, age and educational level positively influence, while for the price the effect is negative; regarding gender, it was concluded that women are less willing to pay for organic products than men and single people are less willing to pay for organic products. A lower price would favor organic consumption since 85% do not consume them because of their high prices.

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