Trends in
Agricultural Economics

A Survey on Factors Affecting on Consumer's Potential Willingness to Pay for Organic Products in Iran (A Case Study)*

M. Ghorbani and S. Hamraz
Department of Agricultural Economics, Agricultural College,
Ferdowsi University of Mashhad, Mashhad, Iran

Abstract: This study determined factors influencing on consumer's potential willingness to pay for organic products in Iran. Data collected with filling 240 questionnaires in 2006 from Mashhad's households and analyzed using Tobit model. Results showed that product appearance and measure of consumers' information is effective on willingness to pay for organic products. In addition, consumers' anxieties from chemical residue in nutrition have positive effect on willingness to pay for these products. Also, results showed that household's education level has negative effect on willingness to pay for organic products. encourage of consumers to organic products consumption, encourage farmers to produce organic products and without any chemical material and make sustainable marketing for organic products, increasing the households awareness about organic products, expansion of organic product cultivation, government payment for supporting of producers suggested.

Key words: Organic food, households, tobit, government payment, chemical residue

INTRODUCTION

The increasing consumer demand for higher quality and safety food products makes organic food products an interesting consumption option. Interest in organically produced food is increasing throughout the world in response to concerns about intensive agricultural practices and their potential effect on human health as well as on the environment. In Iran, as in many Asian countries, the rapid socio-economic development was accompanied by a modernization and industrialization of the agri-food production. Loureiro *et al*. (2001) showed that factors affecting the probability of choosing organic apples are consumers' environmental, food safety attitudes and socio-demographic characteristics. Results of Torjusen *et al*. (2001) indicated that income is positively related to the probability of buying organic foods, while other socio-demographic characteristics are not statistically significant. Millock *et al*. (2004) showed that higher income, age and education level of the consumer significantly increase the probability of consuming of organic foods. However, the presence of children does not have a significant impact on the probability of consuming organic food products. Chang and Zepeda (2005) revealed that consumers are more anxiety about utilized chemical material and its effect on environment and farm animal. Organic products consumers have more information toward organic products. Also have more tolerance for higher price of these products. Results also showed that more consumer information about organic farming and having label and access to organic products are the most effectiveness ways for transporting organic products to consumption path. Verhoef (2005) indicated that economic and marketing variables have significant effects on both the choice and the frequency of purchasing organic meat while consumers' emotions, environmental considerations and socio-demographic characteristics only affect the frequency of purchase. Durham and Andrade (2005) showed that the main reasons for organic purchase are concern for health and the environment but

Corresponding Author: Mohammad Ghorbani, Department of Agricultural Economics, Agricultural College,
Ferdowsi University of Mashhad, Mashhad, Iran

environment is more effective of health in consumers' decision to purchase. Also, price and demographic variables explain the buying decision. Results of Kuhar and Juvancic (2005) showed that income and the availability of the product in the store largely determine the purchasing frequency of organic fruit and vegetables. Moreover, two quality aspects of a food product (taste and visual attractiveness) and consumers' enviroumental concerns are also factors explaining the frequency of purchasing organic fruit and vegetables. Tsakiridou *et al.* (2006) found that factors explaining the probability of purchase organic olive oil are income, household size, age and whether consnmers pay attention to food labels when shopping. However, consumer's attitudes towards organic product attributes (price, health, etc.), food safety and enviroumental concerns were not statistically significant in explaining the probability of purchasing organic olive oil. Onyango *et al.* (2007) showed that females, younger and more educated people are more likely to buy organic foods. In addition, food attributes such as naturalness, vegetarian and local production are important factors increasing consumers' probability of purchasing organic foods. Wier *et al.* (2008) showed that organic food purchase decisions are primarily motivated by private good attributes such as freshness, taste and health benefits, attributes that may be perceived as being compatible with modern production and sales structure.

Khorasan Razavi is one of the most Northeast provinces of Iran. Mashhad is the biggest city of this province that has 2.85 million people. Agricultural sector in this province is one of the important regions of Iran. In recent year, a new wave for extension and cultivation of organic products is growing in this province especially in Mashhad. So, it is necessary that determine households views of Mashhad about consuming and potential willingness to pay for purchasing of organic product. This information can use in policy making about pricing and marketing of organic products in Khorasan Razavi Province. This research tries to study potential consumers' views toward factors affecting on organic products demand on sample of Mashhad households from Khorasan Razavi Province of Iran.

MATERIALS AND METHODS

Data

To potential consnmers' views toward factors affecting on organic products demand and effectiveness of each factor on willingness to pay for these products a survey carried out in 2006 in Khorasan Razavi Province. For this purpose, a sample including 240 households of Mashhad selected by using simple random sampling method. Mashhad placed in Northeast of Iran and in Khorasan Razavi Province.

Tobit Model Specification

This research to study factors influencing on willingness to pay for organic product used Tobit model that classify in limited dependent variables models (Maddala, 1983). According to computed partnership index and defined sensor threshold (a = 0) Tobit model defined as follow:

$$\begin{aligned} Y_i^* &= B'X_i + u_i & i &= 1,2,........,N \\ Y_i &= B'X_i + u_i & Y_i &\geq a \\ Y_i &= 0 & Y_i &< a \end{aligned} \tag{1}$$

where, Y_i^* is Latent or unobserved variable (an index of households willingness to pay for using the organic products) and Y_i observed variable and X_i is a vector of repressors (here variables influencing on willingness to pay of households) including: age (X_1), education (X_2), family size (X_3), income (X_4), sex (X_5), acquaintance with organic products (X_6), anecxiety of existence chemical residue (X_7), freshness of products external (X_8), nutrition value (X_9), confidence about organic product test (X_{10}). B is a vector of parameters values and u is an error term. Some of the households interviewed did not have any willingness to pay. For the households that had willingness to pay is the actual level of

willingness to pay for consuming of organic products. For those not undertaking willingness to pay is zero. In Tobit model dependent variable is a random variable and has probability distribution and it possible to determine each observation probability.

$$p(Y_i = 0) = p(u_i < B'X_i) = 1 - F(B'X_i) \tag{2}$$

$$p(Y_i > 0) = 1 - p(Y_i = 0) = F(B'X_i) \tag{3}$$

Equation 2 and 3 present probability on each zero and non zero observation respectively that P is probability distribution and F(0) is cumulative density function of determined error in B'X_i asures according to define of cumulative density function for censored random variable provide from Eq. 4:

$$F(Y_i - B'X_i) = F(u_i) = p(Y_i > 0)F(Y_i / Y_i > 0) \tag{4}$$

As u_i in Eq. 1 for Y_i more than zero means censored random variable and destitution function of Y_i having similar distribution function as u_i, therefore Eq. 4 for more that zero observation and if u_i assumed to have normal distribution:

$$F(Y_i - B'X_i) = F(u_i) = (2\pi\delta^2)^{\frac{1}{2}} EXp \left[-\frac{(Y_i - B'X_i)^2}{2\delta^2} \right] \tag{5}$$

where, δ^2 is error term variance and π is the constant term, according to define, likelihood function determined by multiply probability distribution function of both sum of observation, means:

$$L = \Pi_0(1 - F(0)) \ \Pi_i (2\pi\delta^2)^{\frac{1}{2}} EXp \left[-\frac{(Y_i - B'X_i)^2}{2\delta^2} \right] \tag{6}$$

where, Π_0 and Π_1, respectively equal to multiply observations that equal to zero and more than zero:

$$\log l = \sum_0 \log(1 - F(0)) + \sum_1 \log(2\pi\delta^2)^{-\frac{1}{2}} - \sum_i \frac{1}{2\delta^2}(Y_i - B'X_i)^2 x \tag{7}$$

Through maximum of Eq. 7 two parameters δ and B or model parameters determined where $\sum_1$ and $\sum_0$, respectively sum of N_1 and N_0 are zero and non zero:

$$B_{ML} = (C_1'C_1)^{-1}C_1'Y_1 - \delta(C_1'C_1)^{-1}C_1'C_0' \gamma_0 \tag{8}$$

$$B_{ML} = B_{OLS} - \delta(C_1'C_1)^{-1}C_0' \gamma_0 \tag{9}$$

where, C_1 $K \times N_1$, Xi matrix for bigger than zero observation and C_0 is N_0 matrix.

$$\gamma = \frac{\phi(I)}{1 - \Phi(I)} \tag{10}$$

where, ϕ is probability distribution function (PDF) and Φ is cumulative density function (CDF) and $I = -\frac{XB}{\delta}$. Expected value in Tobit model defines from Eq. 10 and for observation more than zero defines from Eq. 11 (Eq. 6, 9, 12, 13):

$$E(Y_i) = X_i B\Phi(I) + \partial\phi(I) \qquad i = 1, 2, \ldots, N \tag{11}$$

$$E(Y_i / Y_i > 0) = X_i B + \partial \frac{\phi(I)}{\Phi(I)} \qquad (12)$$

Tobit model and ML estimator's addition to present unbiased estimators provide the situation to separate change effects of each exogenous variable on dependent variable into two effects, change in probability of potentially responders to actually partners and effect of change in activity measure of present partners. Total effect (total elasticity) is change of each effective variables such as X_j on expected value which makes by Eq. 13 that B_j is the variable X_j estimated coefficient and is the probability of existence in actual partnerships and total effects separate as Eq.13:

$$\frac{\partial E(Y_i)}{\partial X_i} = B_j \Phi(I)$$

$$\frac{\partial E(Y_i)}{\partial X_i} = \Phi(I) \left[\frac{\partial E(Y_i / Y_i > 0)}{\partial X_i} \right] + E(Y_i > Y_0) . (\frac{\partial \Phi(I)}{\partial X_i}) \qquad (13)$$

That first term from right hand shows effect of changes in variable X_j on partnership measure of enjoyed responders, multiply probability of settle in this group (effect of $Y_i > 0$) and the second term from right hand shows changes in variable X_i on probability of enjoyment responder to partnerships of pay for organic foods, multiply expected value for partnerships (effect of $Y_i > 0$).

Total elasticity = Observed elasticity (effect of $Y_i > 0$)+ expected elasticity (effect of $Y_1 > 0$)

Reported parameters as total effect, percent change in partnership measure for all of potentially and actually partnerships for one percent change in each o f independent variables and effect of $Y_i > 0$ shows ouly same reaction from people that have potential partnership. Effect of $Y_i = 0$ shows also same reaction from people that could have actual partnership and so that present probability of settle into actual partnerships (Loureiro *et al.*, 2001).

RESULTS AND DISCUSSION

Economical-Socially Attributes

Table 1 showed economical- socially attributes of the sample. Average age of responders is 35.81 years with 30.65 year in men and average age 30.65 year in women. Also, average education of responders is licentiate's degree, average family size is 4 person and average income of responders is about 2900 thousand rials per month.

According to Table 2 age, family size, organic products external freshest are statistically significant. Education levels, family size and nutrition value have negative effect on willingness to pay for organic products. According to Table 2, with increasing household's age, willingness to pay for purchasing organic products will increase. Older people have higher level of willingness to pay for organic products. Because these households are more awareness toward organic products. Several

Table 1: Average key characteristics of selected sample

	Average		
Attributes	Women	Men	Total
Age (year)	30.65	38.00	35.81
Education (class)	4.94	4.40	4.56
Number of family (person)	3.12	4.15	3.84
Monthly income (thousand rials)	3035.30	2863.80	2914.90

Table 2: Tobit model of potential willingness to pay for purchasing of organic products

Variables	Regression coefficients	t-test	Normalized coefficients
Age (X_1)	0.9487	1.90***	0.286
Education (X_2)	-3.1153	-1.27ns	-0.093
Family size (X_3)	-5.3347	-1.59***	-0.159
Income (X_4)	0.0344	1.06ns	0.001
Sex (X_5)	2.5584	0.22ns	0.076
Acquaintance with organic products (X_6)	5.004	0.28ns	0.149
Anxiety of existence chemical residue (X_7)	21.448	1.45ns	0.640
Freshness of products external (X_8)	29.012	1.84**	0.866
Nutrition value (X_9)	-40.164	-1.37ns	-1.199
Confidence about organic product test (X_{10})	-13.611	0.44ns	-0.406
Constant	5.842	0.11ns	0.174
LR = -185.23			

Squared correlation between observed and expected values = 0.21. **, *** Significant at 5 and 10% level; ns: Non-significant

Table 3: Elasticity of willingness to pay for organic products

Variables	Elasticity		
	Willingness to pay index (Certainty)	Expected willingness to pay	Total elasticity
X_1	1.072	1.524	2.596
X_2	-0.448	-0.637	-1.085
X_3	-0.919	-0.647	-1.566
X_4	0.451	0.317	0.768
X_5	0.080	0.056	0.136
X_6	0.208	0.147	0.355
X_7	0.810	0.570	1.380
X_8	1.096	0.771	1.867
X_9	-1.239	-1.223	-2.962
X_{10}	-0.589	0.414	-0.175

studies found that younger consumers have higher willingness to purchase for organic products than older consumers. However, other studies found that older consumers also have a high willingness to buy organic products. Consumers, who have more income, higher level of willingness to pay for organic products. Also, Wier *et al.* (2008) revealed that disposable income, age and education significantly increase organic budget share. Schobesberger *et al.* (2008) showed relationship between income and education and purchasing of organic product is positive. Women consumers have more willingness to pay for organic products because awareness level of women about nutrition is high. Awareness about organic products also has positive effect on willingness to pay for organic products. People who have information about organic products have higher level of willingness to pay. The other effective factor is anxiety about existence chemical residue in nutrition. People that are anxiety about chemical residue, have higher level of willingness to pay for purchasing organic products.

Wier *et al.* (2008) showed that health considerations play a major role in consumer preferences for organic foods. Other important attributes are enviroumental, animal welfare and quality attributes. Also, the pioneers of organic consumption were primarily motivated by enviroumental concerns, but that as food safety concerns increase, the demand for organic foods increases faster. According to Table 3, revealed that people age have positive relationship with willingness to pay, i.e., with increasing one unit of people age willingness to pay for organic products will increase 2.596%, that 1.524% of it is belong to people which now have willingness to pay for organic products and 1.072% of it belong to people that want to purchase organic product in future. Willingness to pay have negative relationship with education level such that with increasing education level, willingness to pay measure will decrease 1.085% that 0.637 of it belong to present consumers and 0.448% of it belong to people that want to purchase in future. Results showed that with increasing family size willingness

to pay for organic products will increase, such that with increasing one unit of family size willingness to pay will decrease 1.566%, that 0.919% of it belong to consumers that want to purchase organic product now and 0.647% belong to people that will buy these products in future. Also, households income have positive but little effect on willingness to pay, such that with increasing one unit (10000 rials) in households income, willingness to pay will increase 0.768%, which 0.451% of it belong to current demand organic product and 0.317% belong to consumers that will purchase these products in future. Having anxiety toward existence chemical residue in conventional nutrition products is one of items that have positive effect on willingness to pay for organic products, i.e., with 1% increasing in anxiety about existence chemical residue willingness to pay for organic products will increase 1.38%, so 0.81% of this measure belong to households that want to consume organic products now and 0.57% belong to households that want to purchase these products in future. Results showed that organic product external will increase willingness to pay for these products. Therefore, if external products improve 1%, willingness to pay for organic product will increase 1.867% so that 1.096% of it belong to people that want to consume organic products now and 0.771% belong to groups of consumers that want to purchase organic product in future. Also, nutrition values are not important for consumers and even have negative effect on willingness to pay for organic products. As with 1% increase in nutrition value of products, will decrease willingness to pay eqnal to 2.962%, where -1.739% of it belong to that group of people want to consume organic products now and 1.223% of it belong to people that will consume this products at future.

According to estimated results, encourage of consumers to organic products consumption, encourage farmers to produce organic products and without any chemical material and make sustainable marketing for organic products, increasing the households awareness about organic products, expansion of organic product cultivation, government payment for supporting of producers suggested.

CONCLUSION

This study carried out to determine factors influencing on consumer's potential willingness to pay for organic products in Iran by using data of 240 households of Mashhad and Tobit model in 2006. Results showed that product appearance and measure of consumers' information is effective on willingness to pay for organic products. In addition, consumers' anxieties from chemical residue in nutrition have positive effect on willingness to pay for these products. Also, results showed that household's education level has negative effect on willingness to pay for organic products. Encourage of consumers to organic products consumption, encourage farmers to produce organic products and without any chemical material and make sustainable marketing for organic products, increasing the households awareness about organic products, expansion of organic product cultivation, goverument payment for supporting of producers suggested.

REFERENCES

Chang, S.H. and L. Zepeda, 2005. Demand for organic food: Focus group discussions in Armidale. Agric. Res. Econ., 6: 1-27.

Durham, C.A. and D. Andrade, 2005. Health vs. enviroumental motivation in organic preferences and purchases. Proceedings of the American Agricultural Economics Association Annnal Meeting, Jul. 24-27, Providence, Rhode Island.

Kuhar, A. and L. Juvancic, 2005. Modelling consumer's preferences towards organic and integrated fruits and vegetables in Slovenia. Proceedings of the 97th EAAE Seminar of Economics and Policy of Diet and Health, Apr. 21-22, University of Reading.

Loureiro, M.L., J.J. McCluskey and R.C. Mittelhammer, 2001. Assessing consumer's preferences for organic, eco-labeled and regular apples. J. Agric. Res. Econ., 26: 404-416.

Maddala, G.S., 1983. Limited-Dependent and Qualitative Variables in Econometrics. Cambridge University Press, Cambridge, UK., ISBN-13: 9780521338257.

Millock, K., M. Wier and L.M. Andersen, 2004. Consumer's demand for organic foods-attitudes, value and purchasing behavior. Proceedings of the 13th Annual Conference of European Association of Environmental and Resource Economics, Jun. 25-28, Budapest, Hungary.

Onyango, B., W. Hallman and A. Bellows, 2007. Purchasing organic food in US food systems: A study of attitudes and practice. Br. Food J., 109: 399-411.

Schobesberger, B.R., I. Darnhofer, S. Somsook and C.R. Vogl, 2008. Consumer perceptions of organic food in Bangkok, Thailand. Food Policy, 33: 112-121.

Torjusen, H., G. Lieblein, M. Wandel and C.A. Francis, 2001. Food system orientation and quality perception among consumers' and producers of organic food in Hedmark County, Norway. Food Qual. Prefer, 12: 207-216.

Tsakiridou, E., M. Konstantinos and I. Tzimitra-Kalogianni, 2006. The influence of consumer's characteristics and attitudes on the demand for organic olive oil. J. Int. Food Agribus. Market., 18: 23-31.

Verhoef, P.C., 2005. Explaining purchase of organic meat by Dutch consumers. Eur. Rev. Agric. Econ., 32: 245-267.

Wier, M., K. O'Doherty-Jensen, L. Mørch-Andersen and K. Millock, 2008. The character of demand in mature organic food markets: Great Britain and Denmark compared. Food Policy, 33: 406-421.