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Estimating public participation in investment organic products in Babol (Case Study: Organic rice)

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Abstract
Health and safety are considered to be significant factors in today life. In recent years, consumers concern in respect to the environmental and health issues associated with the food products has increased. As a consequence, demand for organic products has subsequently augmented. The present study provides marketing data in terms of consumers preferences and their willingness to pay for organic agricultural products in Babol city. The main objectives of this study include examining the consumers willingness to pay for organic rice and estimating public participation in investing in organic rice in Babol city. In the present research, contingent valuation method (CVM) using probability logistics function and limited two-part questionnaire, was applied. The findings derived from the Logit model for rice indicated that education level, cancer experience and insurance experience variables were significant at 1 %. The mean of willingness to pay for 1 kg organic rice was estimated to be 124.361 $. According to the average exchange rate for six months of 2015 (2.732 $), the studied family in this research tends to monthly assign 4.55 $ of its revenue to purchase organic rice. Furthermore, the *level of public participation in investing in organic products was estimated to be* 616.177 $. The aforementioned results provide important data concerning the production of organic agricultural products.

Keywords: Contingent valuation method, Logit model, willingness to pay, Organic rice, Babol City.

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Introduction

Organic farming is an agricultural production system based on respect for the natural cycles where sustaining people's health, soil, and ecosystems have been taken into account (Kuchaki, 2004). This word that once used to be used only for agriculture and food has now entered other areas of human needs such as clothing and cosmetics, but the food is still at top of attention, because organic farming is a way of farming that in entire process from planting to harvesting, collection and packaging of agricultural products no fertilizers and chemical pesticides are used, so the result of this farming is healthy products. Consumption habits are changing in modern society and the last report shows a greater concern for health and the environment (Martinez, Karasco et al., 2004; Smith, and Marsden, 2004). In food choices, consumers allocate an important role to moral, environment and health factors (Torrisen et al., 2001).

In terms of manufacturer, the development of organic farming in the world and in the past few years has been very important. In 2002, the area under organic cultivation worldwide was 22,811,267 hectares and the number of farms was 398,804 that is 2% of the total area for agricultural use in the world (FAO, 2003).

Growing markets for food show that organic farming certification is an important opportunity for the rural sector that can be benefited from in international trade (Ghorbaani et al., 2007). On the other hand, because Iran has diverse climatic conditions and large and rich areas of areas with biodiversity, agriculture plays a major role in the economy. Many Iranian farmers farm based on the traditional method of cultivation, which is comparable to organic farming, and uses chemicals such as pesticides, herbicides, chemical fertilizers minimally. Higher prices for organic products are the result of higher utility that consumers of these products see in them as with high quality, healthy and environmentally consistent. Rice is one of the most important crops domesticated by humans, and about 16 percent of the world's arable land is under rice cultivation.

Rice is obtained from moderate and dry areas and is planted as high as 4750 meters above sea level (Khodabandeh et al., 1996). In Iran, rice is the most important crop and a major source of protein and calories needed by the Iranian people. The total area under rice cultivation is more than 600 hectares and common in 15 provinces. However, more than 80 percent of the rice cultivation area is in the northern provinces of Mazandaran and Gilan. Estimates suggest that 265,000 hectares in Mazandaran, and 230,000 hectares in Gilan province has been under rice cultivation. Area under rice cultivation in Babol is 45444 hectares. Babol is located in Mazandaran. This area is 14301 square kilometers, which is 5.94 percent of Mazandaran. This city is located between 05' 36° and 35' 36° latitude, and 30' 52° and 45' 52° longitude. According to 2012 census, the population of Babol is 495,472 people. The average per capita consumption of rice is 42 kg in Babol. Based on the above information and the price of non-organic rice (different types between 40,000 and 70,000 Riyals), a citizen of Babol pays an average value of 2.31 million Riyals a year for rice consumption.

Contingent Valuation Method (CVM) is increasingly used for valuing organic products is worldwide. A study conducted by Meyer and Woodward (1999) in Germany, stated that consumers are willing to pay 34% for animal products, 52% for fruits and vegetables, and more than 39% for grain products. According to the study conducted by Gill et al. (2000) in Spain, it was shown that consumers who are concerned about a healthy diet and environmental deterioration are more likely to buy organic food and are willing to pay the higher price. In the research conducted by the Antornou Foundation of consumer opinion on the price offered, 47 percent of consumers were willing to pay more for organic products. Rodriguez et al (2007) studied consumers' willingness to pay for organic products in Argentina.

Their findings showed that consumers pay more money to buy organic products, and this amount varies between 6 to 200 percent. Tagbata and Serix (2008) studied the effect of the organic label on consumers' willingness to pay in France. The results showed that half of consumers are sensitive to buy food with organic label. The study by Arcadio et al (2012) showed a positive desire to pay 130 extra Chilean peso for per kg of organic apples and they have a greater tendency to produce organic apples. Mafi and Saleh (2009) estimated consumers' willingness to pay for organic vegetables and cucumbers in Gilan and Tehran. The results showed that income and knowledge about cancer have positive effect on willingness to pay.

Materials and methods

Evidence has shown that organic agricultural foods in Iran are non-market goods. This is because still consumers are not always able to distinguish organic from non-organic, which is due to deprivation in issuing certification and lack of awareness about these types of products. According to what was said, the market for organic food in Iran does not follow the rules of the common market and consumers often doubt on the authenticity of organic products on the market, and see them as "non-market" products. However, many consumers are willing to pay higher prices for food safety and organic products.

In this way, consumers increase their utility level and health risks will reduce. However, consumers are not able to ensure food safety before purchase. As a general conclusion, we can say, "safety" is the most important feature of these products, which is a common definition for such non-market goods in many countries including Iran. There are several economic methods for valuation of non-market goods. One of these methods is contingent valuation method (CVM).

CVM is an economic technique to assess such products. CVM often refers to a preferred model and is against a clear preference model based on price. Typically, the survey asks people's willingness to pay (or willing to accept) for the use of (or compensation for loss) features like organic food products with environmental benefits associated with them. In fact, CVM allows to directly estimate WTP using various analytical techniques (Boukalti and Nardla, 2000).

Consumers simply show their willingness to pay hypothetically without buying the product. As explained earlier, contingent valuation method directly depends on the willingness of people to pay for a specific commodity. The most important part in the use of contingent valuation methods is selection of appropriate extraction and search for more accurate information. There are various search methods for data collection. To generate WTP data with the highest quality, usually interviews are considered though phone and email have been used in a number of studies. Various techniques exist to extract consumers' willingness to pay, such as the dual format. In this method, a question is given to the interlocutor on the ground whether the respondent pays X price for the goods, or not.

In dual two-dimensional selection model, respondents face two levels of proposals where the second proposal is subject to response to the call the first proposal. If the respondent's answer to the first proposal is "yes," the second proposal is more than the first proposal. If the respondent chooses "No," the second suggestion is a bit smaller than the first offer. In this study, to estimate consumers' willingness to pay for organic rice CVM is used. Suppose the utility function of consumers in Babol is as follows:

$$U = (Y, S) \quad (1)$$

Where, U is indirect utility function, Y is income and S is other social and economic characteristics of the individual. To determine the model to estimate WTP, it is assumed that the proposed price is based on individual utility maximization under the following circumstances to accept or reject it otherwise:

$$U(1, Y - A; S) + \varepsilon_1 \geq U(0, Y; S)\varepsilon_0 \quad (2)$$

In the above equation, A is a proposed amount. ε_1, ε_0 are independent random variables with zero mean equally and independently distributed. Increase of the utility of the individual due to use of organic rice is as follows:

$$\Delta U(1, Y - A; S) - U(0, Y; S) + (\varepsilon_1 - \varepsilon_0) \quad (3)$$

To estimate the CVM function, logit functional form is widely used (Amirnejad et al., 2006). In evaluating the model, logit functional form is used for the study of the effects of the explanatory variables used in willingness to pay for rice. In logit model, the probability of acceptance by individuals is defined as follows:

$$P_i = F_\eta(\Delta U) = \frac{1}{1 + \exp(-\Delta U)} = \frac{1}{1 + \exp -\{\alpha - \beta A - \gamma Y - \theta S)} \quad (4)$$

In the above equation, $(\Delta U)^{F_\eta}$ is the cumulative distribution function with one standard logistic difference for which the explanatory variables such as income, suggestions, age, gender, family size and education level were used for the estimate. Also, β, γ, θ are the estimated coefficients that are expected to be β≤0, γ> 0 and θ> 0 (Hahnemann, 1994). After estimation of the above logit function, we calculate the expected value of WTP, using integration described above. Regression coefficients of the logit model have been specified using maximum likelihood estimates (Letonen et al., 2003). WTP expected value is calculated by integrating accounts range from zero to the highest bidder:

$$E(WTP) = \int_0^{Max\ bid} F_\eta(\Delta U) dA = \int_0^{Max\ bid} \frac{1}{1 + \exp\{-\alpha^* - \beta A\}} dA \quad (5)$$

E (WTP) is the expected willingness to pay and α* is the adjusted intercept thay by means of socio-economic conditions parameters is added to the main intercept a as follows:

$$[\alpha^* = (\alpha - \gamma Y - \theta S)] \quad (6)$$

Statistics and information required for this study were gathered through questionnaires by face to face interviews with citizens of Babol in the summer of 2015 within two weeks. Sampling method is simple random sampling. 100 people were randomly selected in Babol and the explanatory variables were obtained through questionnaires by the subjects.

Results and discussion

Socio-economic characteristics of the respondents are shown in Tables 1 and 2. As seen, the mean age is 34.8, ranging between 20 and 58. On average, each respondent has 14 years of education, and each family consists of 3.6 persons.

Table 1: Statistics of important social and economic variables respondents

Variables	Mean	Standard Deviation	Min	Max
Age of respondents	34.85	9.89	20	**58**
Years of education of respondents	14.05	3.28	5	**18**
Size of families	3.68	1.43	2	**8**
Monthly income (Rls)	5245714.28	2649130.06	2000000	**14000000**

Resource: findings of the study

As shown in Table 2, almost two-fifths of the respondents have BA, BS and more than 10 percent lower than diploma.

Table 2: Distribution of educational level of respondents

Level of education	Master and higher (MS.c)	Bachelor (BS.c)	Associate	Diploma	Less than diploma
Number	15	42	9	27	**12**
%	14.3	40	8.6	25.7	**11.4**

Resource: findings of the study

Table 3 shows a summary of the characteristics of respondents. The results showed that the majority of respondents are in the range of 25-40 years (62.8%) respectively. Under 25 years (5.7 percent) and the least respondents interviewed belong to people who are older than 55 years (2.9 percent). In terms of gender, the majority of visitors (54.3%) were male. More than half (80%) were married.

Table 3: Profile of respondents

Characteristic		Percentage	Number
Gender	Male	54.3	**57**
	Female	45.7	**48**
Age	20-25	5.7	**6**
	25-40	62.8	**66**
	40-55	28.6	**30**
	>55	2.9	**3**

Table 4 shows the response to the bid for safe products in Babol. Results of willingness to pay in this table show that 30 (28.6%) do not accept the first offer. In fact, the respondents were unwilling to pay 75,145 Riyals to organic rice, while 75 subjects (71.4%) accepted. When lower price was offered, 2 subjects (1.9%) rejected the second offer. Respondents who had accepted suggested (75145 Riyals) in the excellent group (150,285 Riyals), 24 subjects (22.8%) accepted the third proposal and 51 refused.

Table 4: Response status to 3 bids

Condition of acceptance		**First proposed price 75145 Rials**	**Lower proposed 37571 Rials**	**higher offer 150285 Rials**
Acceptance of the offered price	Number	75	28	**24**
	Percent	71.4	26.7	**22.8**
Rejection of the offered price	Number	30	2	**51**
	Percent	28.6	1.9	**48.6**
Sum	Number	105	30	**75**
	Percent	100	28.6	**71.4**

Resource: findings of the study

The results of logit model estimation to rice are shown in Table 5. Percent of correct prediction in logit model is estimated as 68% that shows the high prediction power of the model. McFadden and Madala coefficient of determination show how much of dependent variables of the model are described by explanatory variable.

Table 5: Results of the logit model

Variables	**Estimated coefficient**	**T statistic**	**Elasticity**
Constant coefficient	0.85	0.926	**0.287**
Number of family members	-0.287	-1.58066	**-0.0277**
education	0.468	1.847	**0.125**
income	0.0000000363	1.989	**0.0645**
awareness of the organic products	0.473	2.326	**0.194**
history of cancer	1.027	2.18	**0.148**
proposed Price	-0.0000029	-1.99	**-0.03**
Insurance history	-0.451	-1.902	**-0.151**
Percentage of Right Prediction= 0.68			
Log of likelihood function= -68.13			
MC Fadden= 0.1607			
Maddalas= 0.1681			

Resource: findings of the study

Factors affecting willingness to pay for organic products, revenues, history of cancer, history of insurance, awareness of organic products and bid at 1% and the above variables are statistically significant, insurance history and offered price have a negative effect and three other variables have a positive effect on WTP for organic products. Income coefficient and price offered are statistically significant at the 1% level. Bid has a negative effect on the WTP

for organic products. This indicates that under the hypothetical market scenario, the likelihood to pay the price offered is reduced.

Tension calculation for the variables of education years and income showed an increase of 1% in these variables for the possibility of increasing the purchase of rice by 12 and 6 percent. Tension calculation for the offered price and number of family members show that if all factors are held constant, an increase of 1% in the proposed price or number of family members show that if all the variables are constant, an increase of 1% in the proposed price or number of family members reduces the likelihood to buy rice respectively by 3 and 2 percent. Likely to buy rice respectively 3 and 2 to criminate.

The expected willingness to pay value based on the following equation for each person is calculated as a little over 150,000 Riyals.

$$\text{WTP} = \int_0^{150258} \frac{1}{1+\exp\{-(7.6084+0.0000029)\}} db = 152467.33 \quad (7)$$

This amount is the willingness of people to use organic rice. In other words, the least desire for investment is in the development of this product. Based on the average dollar exchange rate in the six months of 2015 (33500 Riyals), the least willing to invest in the development of organic rice in the city of Babol is equivalent to $ 4.551.

According to the population of Babol (495,472 people) and the willingness of people to use organic rice, the participation of the people in investment in organic products can be estimated.

$$152467.33 * 495472 = 7554330 \quad (8)$$

So public participation amount of Babol citizens to invest in organic products will be 7554330 Riyals. Also based on the average dollar amount, public participation of citizens for the investment is as $ 22550.

Conclusion and Recommendations

The results show that the level of education in the logit model has a significant effect on people's participation in investment in the city of Babol is the organic products. This shows that if the level of education increases, attention to food safety and thus public participation increase. There is a significant positive correlation between age and willingness to pay for organic rice, which means that older people tend to pay more for organic products than younger people do. There is also a positive and significant relationship between history of cancer and WTP for organic rice. There is also a significant positive correlation between the level of income of Babol citizens and WTP for organic rice and since there is an inverse relationship between family size and WTP in logit model, reducing per capita income, willingness to pay for organic rice increases by family members' numbers reduction. There is a significant positive relationship between awareness among citizens and WTP for organic products. Therefore, in order to improve the level of people's awareness about organic products, advertising and educational courses for organic products through mass media, schools and seminars are required.

The most important conclusion from this study was that the citizens of Babol desire for investment in the development of organic rice has been positive, and this highlights the need of the citizens to use organic products. The results can provide important information on the product properties to manage agribusiness as a way to identify new sections in the market. Given the importance and benefits of organic agriculture to produce healthy products and

based on the results of this study, some general strategies are provided for the development of organic agriculture:

1. The agricultural sector planners must support leading farmers in organic farming by providing strategies with information and promotional activities for the use of existing capacities in the country, with special attention to the appropriate and separate price for the organic products provide the ground for development and promotion of the sustainable agricultural systems.
2. Holding workshops and exhibitions related to organic farming and activation, development and promotion of agricultural associations related to organic products for all segments of society from public and private institutions with the aim of increasing consumer knowledge about the advantages of organic products is recommended, so that people can be healthy and change their tastes towards these products.
3. One of the problems of organics markets is the products' higher price compared to other products. With governmental support (subsidies for organic products) organic products share in the consumer basket can be increased. By supporting organic farmers, insuring their products, the development of local markets for organic products and economic review and identification of international markets for the export of organic products, creating places for the storage of organic products and providing transport with cooling systems for this type of products, government and public organizations can strengthen the motivation and attitude of farmers for cultivation of organic products.
4. Successful programs are necessarily the ones where the role of the public is included in the full cycle of planning to implementation, especially if the program is synonymous with behavior change in society. Therefore, it is recommended that government policies be towards attracting public participation in investments for organic products.

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