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Hai, Ngo Minh

Laboratory of Food Marketing and Distribution, Department of Agricultural and Resource Economics, Faculty of Agriculture, Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University

Moritaka, Masahiro

Faculty of Agriculture, Kyushu University

Fukuda, Susumu

Faculty of Agriculture, Kyushu University

森高, 正博

九州大学大学院農学研究院

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Willingness to Pay for Organic Vegetables in Vietnam: An Empirical Analysis in Hanoi capital

Ngo Minh HAI¹, Masahiro MORITAKA^{2*} and Susumu FUKUDA²

Laboratory of Food Marketing and Distribution, Division of Agricultural and Resource Economics,
Department of Agricultural and Resource Economics, Faculty of Agriculture,
Kyushu University, Fukuoka 812–8581, Japan

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High levels of pesticide and chemical fertilizer inside vegetables are always risky to Vietnamese people in general, Hanoi's people in particular when only about 30% of the area for vegetable production in Hanoi are controlled and safely certified by the government. The consumers still become worried, even some of them do not totally trust the safe vegetables because the chemical residue, pesticide levels are difficult to fully check and control due to insufficient capability of the state's agencies. Organic vegetables known as no chemical pesticide and no synthetic fertilizer bring a new choice for consumers. This study aims at evaluating current status of organic vegetables consumption and eliciting consumers' willingness to pay for organic ones in big cities like Hanoi in Vietnam. A sample of 185 respondents surveyed at four big supermarkets in Hanoi was analyzed by descriptive statistics and Contingent Valuation Method (CVM) under double bounded dichotomous choice approach. These results found that about 15% of the consumers already had experience of using organic vegetables, however, eighty-eight percent wanted to try and buy if organic products exist in the market. Major reasons for the limitation in consumption of the organic foods were the lack of information about organic market, inconvenience to buy. Average price paid for organic vegetables was about 70% higher than that of conventional ones. Besides, the consumers who had higher income, more concern about safety of vegetables, and organic-consumed experience in the past would be likely to pay more for organic vegetables. These findings suggest that information about organic vegetables should be widely publicized to consumers and that new organic vegetables shops opened are priority to expand organic market share in the future.

Key words: consumer demand, contingent valuation method, organic food, organic vegetables, willingness to pay

INTRODUCTION

Issues related to food safety and hygiene become increasingly important toward Vietnamese people, particularly the urban consumers (Simmons and Scott, 2008), even among the most concern issues in Vietnam (Sarter *et al.*, 2012). A survey about consumers' perception of safe vegetables in Vietnam found that vegetables were the most important in their daily meal (VINATAS, 2011). However, only 30% of the production area in Hanoi for safe vegetables was legally certified by the government (calculation from Tam, 2010; Hanoi People Committee, 2012). Moreover, due to the government's limitation, controlling of the chemical pesticide and synthetic fertilizer has been difficult. Therefore, some consumers even do not trust about the safe vegetables (i.e. under VietGAP or Global GAP standard) when they still think that the chemical pesticides still exist inside vegetables (Phuong, 2010). Doubt of consumers toward safety of certified labeled vegetables was also found in Thailand (Roitner-Schobesberger *et al.*, 2008).

An introduction of organic farming opens new opportunities for producers and especially for consumers. Having officially established since the mid 1990s, yet organic farming has still been a new concept in Vietnam (Voan, 2006). Up to 2011, organic production area only reached about 23.4 thousand ha, which comprised about 0.23% of the total agricultural production land (excluding forestry land and surface area for fishing) in Vietnam (FiBL and IFOAM, 2013). Among the area for organic production, only 200 ha for organic vegetables was produced in Hanoi, Hoa Binh, Bac Ninh, Vinh Phuc, Lam Dong, Ho Chi Minh and so on (Vietnam Farmer Union, 2012). In recent years, developing organic agriculture has been more paid attention from the government when a National Basic Standard for Organic Products in Vietnam was released in 2006, followed by establishing Vietnam Organics Association in 2011. However, due to the lack of market information and the absence of certification system, Vietnamese consumers are still confused the concept of organic food and they cannot distinguish between organic and safe products (Sautier, 2012; Vietnam Farmer Union, 2012). This may be considered the biggest barrier for expanding organic market share in Vietnam.

Although a large number of studies on organic consumers in Europe and other Western countries like the U.S were introduced, those studies in Asia countries are few (Roitner-Schobesberger *et al.*, 2008). Compared with other countries in the Southeast Asia region such as Thailand or the Philippines, studies on organic agricul-

¹ Laboratory of Food Marketing and Distribution, Department of Agricultural and Resource Economics, Faculty of Agriculture, Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University, Japan.

² Faculty of Agriculture, Kyushu University, Fukuoka 812–8581, Japan

* Corresponding author (E-mail: m-moritaka@agr.kyushu-u.ac.jp)

ture in Vietnam are even limited, especially in terms of consumer demand. Some previous researches about organic foods in Vietnam were usually approached under an overview of production and business of organic foods (Nhan, 2011; Hoa, 2009; Anh and Thuan, 2005) while others focused on links or value chains of organic vegetables (Sautier, 2012; Vietnam Farmer Union, 2012). A report about consumers' willingness to pay toward organic products estimated that Hanoi's consumers were ready to pay higher premium over conventional ones (Huong, 2007). However, Huong's study which only elicited the consumers' demand by descriptive statistics analyses could not identify the factors influencing the consumers' WTP. Hence, in the present study, we hypothesize that consumers in Hanoi are likely to pay higher amount for organic vegetables although few of them already bought organic foods. Furthermore, prices, income, consumers' concerned issues, organic-consumed experience, perception of chemical level, education and age are likely to influence on WTP. Our study applying Contingent Valuation Method (CVM) with double bounded technique was used to estimate WTP and also to show factors affecting WTP toward organic vegetables in Hanoi, Vietnam.

MATERIALS AND METHODS

Data collection

A face-to-face interview with consumers was undertaken at four big supermarkets around the center of Hanoi including Savico Megamall, Big C, Metro and Fivimart in September and October 2012. Only consumers who have been working and have income were sampled. The distribution of respondent over Savico Megamall, Big C, Metro and Fivimart supermarkets are 50, 50, 49 and 36 respectively. The questionnaire structure mentioned three aspects: (1) information related to actual buying toward organic vegetables or not; (2) consumers' demand as well as their behavior and attitudes for organic vegetables; (3) general information about social-economic and demographical characters of consumers. After receiving 202 respondents, we checked that the number of valid sample size was 185.

Analysis methods

First, descriptive statistics and bivariate analyses were used to evaluate the current status of organic vegetables consumption in Hanoi. This method will provide general background about the percentage of consumers who already bought organic vegetables. Besides, reasons for no buying organic vegetables as well as their demands to easily access organic markets are also explored.

Next, to elicit consumers' willingness to pay for organic vegetables we applied contingent valuation method (CVM), which helps to find out how much an individual would be willing to pay by using hypothetical survey questions (Mitchell and Carson, 1989). CVM has widely expanded into many fields such as recreation, hunting, water quality (Mitchell and Carson, 1989) to health economics, transportation safety and cultural eco-

nomics (Venkatachalam, 2004). Recent period, researches about organic food were also applied by Ara (2002), Rodríguez *et al.* (2007) and others. Specific techniques in CVM include bidding games, payment cards, open-ended and dichotomous choice. This study uses double bounded dichotomous choice contingent valuation method (DBDC CVM) because it favors for saving time in surveying at supermarkets and has more efficiency as well as more information than single bounded approach (Hanemann *et al.*, 1991). Many recent researches were also deployed double bounded choice such as Ara (2002), Rodríguez *et al.* (2007), Abdullah and Jeanty (2011) and Claudy *et al.* (2011).

In double bound approach, respondents will be asked by two questions. Question format will be "Are you willing to pay amount of money for organic vegetable that is no chemical, no synthetic fertilizer, no chemical pesticide and good for health" Each question has two choices: yes or no. If saying "yes" in the first question, higher amount of bid will be given in the second question; otherwise, lower amount with saying "no". Therefore, one of four abilities of a respondent can be: Yes-Yes (yy), Yes-No (yn), No-Yes (ny), No-No (nn).

According Hanemann (1991), the probability of answering "Yes" for both questions is expressed

$$\begin{aligned} Pr_{yy}(B, B^u) &= Pr[B \leq WTP, B^u \leq WTP] \\ &= Pr[B \leq WTP | B^u \leq WTP] Pr[B^u \leq WTP] \\ &= Pr[B^u \leq WTP] = 1 - F(B^u) \end{aligned}$$

where Pr_{yy} : the probability of answering "Yes" "Yes"

B : the price in the first question

B^u : the higher price in the second question

WTP: Willingness to Pay

F : Cumulative Distribution function (CDF)

The probability of answering "Yes" followed by answer "No" in question 2 is

$$Pr_{yn}(B, B^u) = Pr[B \leq WTP < B^u] = F(B^u) - F(B)$$

Similarly, probabilities for answers "No-Yes" and "No - No" are:

$$Pr_{ny}(B, B^d) = Pr[B^d \leq WTP < B] = F(B) - F(B^d)$$

$$Pr_{nn}(B, B^d) = Pr[B > WTP, B^d > WTP] = F(B^d)$$

where B^d : lower price in the second question

To estimate the likelihood of responses, maximum likelihood estimation is applied. Given a sample of N respondents, where B_i , B_i^u , B_i^d are bids used for the i^{th} respondent, the log-likelihood function will be:

$$\begin{aligned} \ln L = \sum_{i=1}^N \{ &yy_i \ln Pr_{yy}(B_i, B_i^u) + yn_i \ln Pr_{yn}(B_i, B_i^u) \\ &+ ny_i \ln Pr_{ny}(B_i, B_i^d) + nn_i \ln Pr_{nn}(B_i, B_i^d) \} \end{aligned}$$

where yy , yn , ny and nn are dummy variables. If one respondent say yes-yes (yy) for two questions, then $yy=1$, so others will be zero.

Next step is to choose a model for eliciting WTP. Interval- data model (standard double bounded model) by Hanemann (1991) is chosen. WTP is generally expressed by function:

$$WTP_{ij} = \alpha + \beta Bid_{ij} + \lambda Z_i + \varepsilon_{ij} \tag{1}$$

where α : intercept of the model

Bid is proposed price given to respondents (hypothetical price)

β : the coefficient of Bid

Z_i : the vector of socio-economic demographic variables of consumer i_{th} (see more in Table 1)

λ : the coefficients of Z_i

i : individual consumer (i^{th})

j : kind of vegetables

Vegetables used in this research are tomato and choy sum because they are popular to Vietnamese at survey period. All variables are defined in Table 1. Expected

signs show hypotheses that our study propose.

In Table 1 there is a need to clearly define some variables including edu1, edu2, income and expenditure. Firstly, edu1 includes respondents who gained from 13 to 16 schooling-years, while edu2 consists of those who studied above 16 years. Secondly, income levels are classified: level 1 if average income per household a month is under 8 million VND (under 400 USD), level 2 from 8 million VND to 15 million VND (400 to 750 USD), and level 3 above 15 million VND (above 750USD)¹. Finally, the identification of daily expenditure levels for vegetables of one household is level 1 for an amount under 10 thousand VND, level 2 from 10 to 20 thousand VND, level 3 above 20 to 30 thousand VND, and level 4 above 30 thousand VND.

Table 1. Variables of the double bounded logit model

Variables	Description of variables	Expected Sign (+/-)
<u>Dependent variable</u>		
Resp	Response to bid: receives 1 if answer “yes” with proposed bid amount, 0 if saying “no”	
<u>Independent variables</u>		
Bid	Hypothetical price of organic vegetable	-
Safety	Consumer evaluation about vegetable safety (linkert-scale: 1=very unsafe, 5=very safe)	-
Chemical	Evaluation about chemical pesticide & fertilizer (linkert-scale: 1=very high, 5=very low)	-
Concerned_issue	The most important issue for buying vegetable (0=price, 1=others)	+
Label_recog	Recognition about label or origin of vegetable (1=never, 2=sometimes, 3=always)	+
Orga_cons	Organic vegetable consumption before (0=No, 1=Yes)	+
Age	Age of respondents (years)	+
Gender	Respondents' gender (0=male, 1=female)	+
Edu1	Respondents' education (1=undergraduate, 0=otherwise)	+
Edu2	Respondents' education (1=post graduate, 0=otherwise)	+
Hhsize	Household size (number of family's member)	+
Income	Monthly income of households (3 levels: 1= lowest, 3 = highest)	+
Expenditure	Daily expenditure for vegetables (4 levels: 1= lowest, 4=highest)	+
Savi_code*	Savico supermarket (dummy variable: 1-Savico supermarket, 0=otherwise)	+
Bigc_code	BigC supermarket (dummy variable: 1-Big C supermarket, 0=otherwise)	+
Metro_code	Metro supermarket (dummy variable: 1-Metro supermarket, 0=otherwise)	+
Fivi_code	Fivimart Supermarketdummy variable: 1-Fivimart supermarket, 0=otherwise)	+

Note: * omitted dummy variable out of running the model

Table 2. Bid system for tomato and choy sum in Hanoi

Tomato's Bid (VND)			Choy sum's Bid (VND)		
1 st bid	High bid	Low bid	1 st bid	High bid	Low bid
18,000	24,000	12,000	14,000	20,000	8,000
22,000	28,000	16,000	18,000	24,000	12,000
26,000	32,000	20,000	22,000	28,000	16,000
30,000	36,000	24,000	26,000	32,000	20,000
34,000	40,000	28,000	30,000	36,000	24,000

¹ The identification of ranging income level was based on the calculation of average income from VHLSS (GSO, 2010) for Hanoi's household. Of which, mean income was 402 USD/household/month, five income quintiles were 108 USD, 206 USD, 301 USD, 447 USD, 917 USD.

The parameter of equation (1) would be estimated by running the maximum likelihood estimation of lnL above, using STATA 10.0. In order to identify mean and median WTP, as well as confidence interval, Krinsky and Robb (1986) procedure, applied by Abdullah (2009) and Claudy (2011) is deployed with the commands of Jeanty (2007) using for STATA.

Payment vehicle designing (bid designing)

In this study, designing hypothetical prices (bids) to apply double bound dichotomous was based on the pre-test and the prices of the conventional vegetables in the supermarkets (15,000 VND/kg for choy sum and 20,000 VND/kg for tomato) in September and October 2012. Bidding system was used in Table 2. Each consumer will be asked for answering one of five random bids set above to minimize the bias of starting bids.

RESULTS

Socio-demographic characteristics of respondents and the current status of organic vegetables consumption

sumption

The result in Table 3 shows that 15% of the consumers had experience of buying organic vegetables in Hanoi at least one time (organic buyers) before the survey conducted. Average age of organic buyers was higher than that of consumers who had not bought organic vegetables yet (organic non-buyers). Seventy-five percent of the respondents were women and the gender's difference was non-significant between the organic buyers and non-buyers. In generally, over 50% of the consumers were undergraduates or attained college/university degrees. Although education of the organic buyer seemed higher than that of the non-buyer, these differences had no statistical significance. Meanwhile, the consumers who had experience of purchasing organic foods gained higher income than non-users.

Among 117 consumers hearing or understanding about organic vegetables, those who did not buy comprised 77%. Main reasons for limitation in using organic vegetables were summarized in Fig. 1 including no information about organic market, inconvenience to buy. In fact, twenty-two over 27 consumers felt difficult to find

Table 3. Socio-demographic characteristics of respondents

Variables	Organic buyers n=27 (15%)	Organic non-buyers n=158 (85%)	Sig. of difference tests	Total n=185 (100%)
Average age (years)	38.6	34.3	0.040 ^a	34.9
Gender			0.409 ^b	
Male	19%	26%		25%
Female	81%	74%		75%
Education			0.124 ^a	
High school or less	15%	35%		32%
Undergraduate/graduate	70%	50%		53%
Post-graduate	15%	15%		15%
Household income per month (000VND ^m)			0.034 ^a	
<8,000	8%	28%		25%
8,000–15,000	59%	49%		51%
>15,000	33%	23%		24%
Household size (people)	3.8	4.0	0.293 ^a	4.0

Note: ^m Exchange interest rate was rounded at 20,000 VND for one USD in September and October 2012.

^a Wilcoxon rank-sum test, ^b Chi-square test.

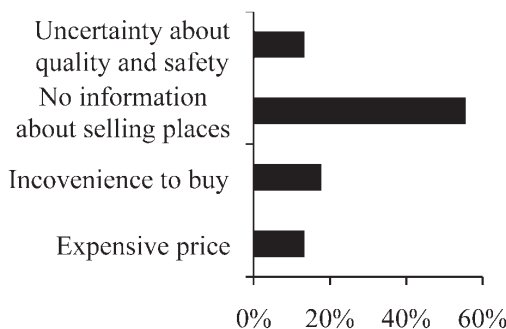


Fig. 1. Reasons for no buying organic vegetables (n=90).

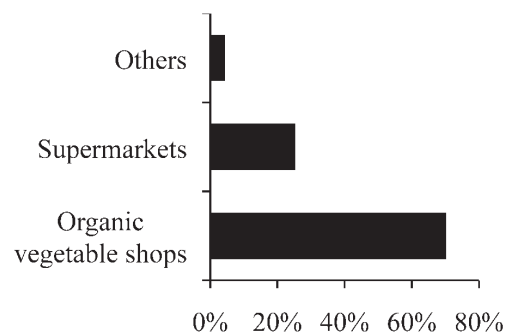


Fig. 2. Percentage choices about organic selling places (n=185).

and buy organic ones. Fig. 2 indicates that to help consumers easy to access organic market, new organic vegetable shops opened is first priority, followed by more stores in supermarkets.

WTP for organic vegetables and factors affecting WTP

Table 4 indicates that about 88% of the consumers wanted to try or buy organic vegetables if these products exist in market, while 12% were not sure because they had not known about the prices and other buying conditions. Especially, no one refused to try organic vegetables if they have chances after being clearly explained about organic ones.

Besides, the result of from estimating mean/median WTP in Table 5 shows that consumers were willing to pay about 35 thousand VND per kilogram for tomato and about 26 thousand VND per kilogram for choy sum². This means that consumers would pay around 70% higher for organic vegetables than conventional ones sold in the supermarkets. The estimation also indicates that 95% confidence interval of higher premium of organic tomato and choy sum ranged from 153% to 237%, and 155% to 210% respectively.

Determinants influencing on the WTP for organic tomato and choy sum from double bounded logit model were presented in Table 6. These results of model for tomato and choy sum shared some same significant factors. For instance, variables including concerned_issue, expenditure, orga_cons, income, and bid were significant toward both two models. However, chemical variable only had effect to choy sum model, not in tomato model. Reversely, label_recog gender, edu2 were only related to WTP of tomato, not significant toward choy sum.

Table 4. Percentage of consumers who are willing to buy if organic vegetables are available

	No. respondents	Percent
Yes	163	88.1
Unsure/uncertain	22	11.9
No	0	0
Total	185	100

In Table 6, bid variables which showed negative signs as expected at 1% level expressed a reverse effect on WTP. Specifically, one-unit decrease in bid would increase odds ratio by 28% and 23% in tomato and choy sum models respectively (Table 7). Also, a negative sign of chemical variable toward WTP of choy sum revealed that the consumers would pay more money for organic choy sum if they perceived currently high level of chemical in vegetables. However, this variable showed no significant effect on WTP for tomato product. The estimation clarified that concerned issue had the strongest influence on the consumers' WTP at significant level of

Table 6. Estimates from double bounded logit model for tomato and choy sum

Measures	Tomato		Choy sum	
	Coefficient	SE	Coefficient	SE
Safety	-0.35	0.22	-----	-----
Chemical	-----	-----	-0.58**	0.24
Concerned_issue	1.37***	0.47	1.26***	0.46
Label_recog	0.51*	0.27	0.28	0.26
Expenditure	0.33*	0.20	0.33*	0.19
Orga_cons	0.89*	0.53	1.20**	0.52
Age	0.03	0.02	0.00	0.02
Gender	0.70*	0.36	0.51	0.35
Edu1	0.33	0.35	0.51	0.35
Edu2	1.10*	0.57	0.82	0.56
Hhsize	0.18	0.14	0.20	0.14
Income	0.91***	0.26	0.94***	0.26
Fivi_code	-1.64***	0.52	-0.69	0.49
Metro_code	-0.57	0.46	-0.21	0.47
Bigc_code	-0.54	0.44	-0.20	0.43
Constant	2.15	1.45	2.71**	1.35
Bid	-0.28***	0.02	-0.26***	0.02
Number of obs	185		185	
Log likelihood	-197.08		-204.43	
Wald chi2 (14)	71.48***		67.48***	
FCCC (%)	56.22		49.19	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5. Mean/median WTP for tomato and choy sum

Measures	Tomato (000VND)				Choy sum (000VND)			
	WTP	Lower bound	Upper bound	% Organic/Conventional (95% CI)	WTP	Lower bound	Upper bound	% Organic/Conventional (95% CI)
Mean	39.36	32.81	88.86		30.89	26.14	55.98	
Medium	34.70	30.60	47.54	173% (153% – 237%)	26.03	23.25	31.56	173% (155% – 210%)

Note: Mean and median were computed by applying Krinsky and Robb (95%) confidence intervals for WTP measures (5000 reps)

² Median values were chosen to reflect average WTP for tomato and choy sum because they are less affected by outliers than mean values.

Table 7. Influence magnitude of explanatory variables on WTP

	Tomato			Choy sum		
	Coef.	Exponentiated coef.	%change in odds	Coef.	Exponentiated coef.	%change in odds
Chemical				-0.58	0.56	-44.0
Concerned_issue	1.37	3.94	293.5	1.26	3.53	252.5
Label_recog	0.51	1.67	66.5			
Expenditure	0.33	1.39	39.1	0.33	1.39	39.1
Orga_cons	0.89	2.44	143.5	1.20	3.32	232.0
Gender	0.70	2.01	101.4			
Edu2	1.10	3.00	200.4			
Income	0.91	2.48	148.4	0.94	2.56	156.0
Fivi_code	-1.64	0.19	-80.6			
Bid	-0.28	0.76	-24.4	-0.26	0.77	-22.9

Table 8. Response distribution

	Percentage of respondents (n=185)				Total
	Yes-Yes	Yes-No	No-Yes	No-No	
Tomato	34.6%	35.7%	18.4%	11.3%	100%
Choy sum	35.7%	26.5%	26.5%	11.3%	100%

1%. When the consumers pay more attention to quality and safety of vegetables than vegetables' prices, probabilities of saying "yes" in WTP question for organic tomato and choy sum will increase by 3 times and 2.5 times respectively (Table 7).

Furthermore, Table 7 also indicates the WTP of consumers who already bought organic vegetables would be two to three times as high as that of organic non-buying ones. Important economic variables including average expenditure and income were also found to be significant as economic theory at 10% and 1% respectively. The calculation of Table 7 implies that odd ratios about WTP rose by 150% when income increased one thousand VND.

In this study, consumer behavior about label recognition also had positive influence on WTP toward organic tomato at 1% significance, but not on WTP of choy sum. Different consumers' characters such as gender and education were also found to be statistically significant only on tomato model, but choy sum one. For instance, the results in Table 6 and 7 showed that female and post-graduate consumers would have higher probability in buying organic tomato with percent change in odd ratios of 100% and 200% respectively. Although geographical location of Hanoi's consumers was not directly mentioned in this study, *fivi_code* variable (expressing consumers interviewed in Fivimart supermarket) found to be significant might explain difference about WTP in different areas.

In order to evaluate the performance and goodness-of-fit of the models, Wald test and Fully, Correctly, Classified Cases (FCCC) by Kanninen and Khawaja (1995) were used. First, Wald tests for tomato and choy sum which had significance at 1% level show that explanatory variables were generally suitable. Continuously, FCCC was applied to evaluate the fitness. This method

will fully and correctly classify each observation into one of four categories "yes – yes", "yes – no", "no – yes" or "no – no", and then calculate the percentage. The highest FCCC will be chosen among models. Also, the authors also point out one criterion called "maximum chance" to judge the FCCC value. Following this approach, if a model' FCCC is higher than maximum chance criterion denoting C_{max} , the model could be considered for acceptance.

We found that C_{max} values from Table 8 were 35.7% both tomato and choy sum models, while FCCC were 56.2% and 49.2% for tomato and choy sum models respectively (Table 6). Hence, the two proposed models for tomato and choy sum were appropriate.

DISCUSSION

The study found that only few consumers in Hanoi used organic vegetables. One of the most important reasons was the lack of information about organic market. This percentage of using organic products from buyers is fairly similar to that of India with 9% (Garibay and Jyoti, 2003). This result, however, is small compared with 33% in Indonesia (Wahida *et al.*, 2012), 39% in Bangkok (Roitner-Schobesberger *et al.*, 2008) and 55% in Chiang Mai – Thailand (Somsak and Blut, 2012). Main reasons for organic share limitation may be due to the lack of information, knowledge about organic ones, and other factors (Garibay and Jyoti, 2003). Despite of limitation in current market share, consumers' demand for organic product is high in Hanoi. The results about high percentage of willingness to pay show consistence with other studies such as Ara (2002), Huong (2007), Dipeolu *et al.* (2009), Wahida *et al.* (2012), and Somsak and Blut (2012). For example, Huong (2007) reported that 93% of

Vietnamese consumers had a high desire for organic vegetables. In a study about WTP for organic vegetables in West Africa, 85% of the consumers in Ghana and 95% in Benin agreed to buy a higher price for organic vegetables (Coulibaly *et al.*, 2011).

In this study, the average premium WTP, 70% higher for organic over conventional vegetables, was higher than that of Huong's calculation (2008). According to Huong's estimation, about 48% of the consumers were likely to pay 50% or higher levels for organic than for conventional vegetables. This difference can be partly explained by differences in sampling area when our study was conducted in only Hanoi, while Huong's research involved Hanoi and Haiphong. This average WTP, however, is also consistent with those of Rodríguez *et al.* (2007) reporting a higher premium of 87%, and Coulibaly *et al.* (2011) showing premium from 50% to 66%. Coulibaly *et al.* (2011) estimated that consumers were likely to pay a premium of over 50% for organic vegetables.

Regarding factors influencing on WTP, consumers' concern about their health found to be the most important motivation to trying organic vegetables in this study is also similar to the result of Somsak *et al.* (2012). Roitner-Schobesberger *et al.* (2008), Sangkumchaliang and Huang (2012) also identified that consumers' expectation of good health was main reason to buy organic food. Income of consumers also has high impact on consumers' demand for organic food. The positive effect of income on WTP in our study is supported by Kalashami *et al.* (2012), Somsak *et al.* (2012), Rodríguez *et al.* (2007), Dettmann & Dimitri (2007), and Akgüngör *et al.* (2010). Roitner – Schobesberger *et al.* (2008) found that respondents who already bought organic vegetables had higher income than those who had not bought them. Other studies, however, showed no relationship between income and consumer's decision to buy organic foods (Basarir and Gheblawi, 2012; Li *et al.*, 2007).

Further, the finding that consumers already used organic vegetables would be more willing to buy than non-consumers coincides with the results of Rodríguez *et al.* (2007), Basarir and Gheblawi (2012), and Wahida *et al.* (2012). This result may reveal the loyalty of consumers and recommend one way to increase the demand if producers have appropriate marketing channels. Households' daily expenditure for vegetables was also found to be positively significant at 10% in both organic tomato and choy sum. Household expenditure which, in theory, may have positive relationship with income was found to less correlated with family's revenue. This issue may be explained by Vietnamese household's behavior in which people usually use vegetables in daily meal regardless of income level. Basarir and Gheblawi (2012) also reported that consumers who had higher income and weekly expenditure on fruits and vegetables would be likely to pay more for organic ones.

Consumer's evaluation about chemical residue in conventional choy sum had an inverse effect on organic purchasing–decision. When they recognize high risk of chemical pesticide to their health, they want to find safer kinds. The effect of chemical pesticide on WTP which

was only found in choy sum, not tomato may be due to different perceptions about chemical levels inside each kind of products. For instance, consumers may think that choy sum – a leafy vegetable is easily contaminated by chemical than tomato that is partly protected through its skin. This effect of pesticide residue has consistence with the result of Coulibaly *et al.* (2011) in which Ghana's consumers would be more likely to buy organic cabbage if their perception about pesticide usage is high. These authors' finding, however, identified that pesticide residue also influenced on WTP for tomato. Contrary to this study, a negative effect of pesticide's perception on consumers' demand for organic vegetables was found in the finding of Rodríguez *et al.* (2007).

Different effects of factors to various kinds of vegetables became clearer when label recognition, gender and education were considered in the study. Specifically, higher label recognition, female and post-graduate education level positively influenced only the consumers' demand on tomato, not on choy sum'. First, impact of label recognition which had no relationship with WTP in both cabbage and tomato products (Coulibaly *et al.*, 2011) was only significant at 5% in tomato model, not choy sum in this study. Rodríguez *et al.* (2007) also reported that label recognition effected on WTP of organic products such as chicken and aromatic herbs, but not leafy vegetables. By observing the labels of various products in the supermarkets, we recognized that the tomato was packed well with clear label, whereas the choy sum, a kind of leafy vegetable, was tightened by lines with unclear information about the origin. This might infer that products with clear labels could increase their reliability to persuade consumers. Second, women who paid more for organic products than men in Wahida *et al.* (2012)'s study were found to be significant in this finding. A positive impact of women on WTP also came from findings by Jolly (1991), Buzby *et al.* (1994). However, relationship between gender and demand for organic foods seemed to be unclear (Owusu and Anifori, 2013; Li *et al.*, 2007; Cranfield and Magnusson, 2003). In this study, gender also only affected WTP for tomato, not choy sum. Therefore, it should be conservative to conclude the impact of gender to organic demand. Similarly, consumers who had post-graduate degrees positively influenced WTP only on organic tomato, not on organic choy sum in our study. Results from Dettmann and Dimtri (2007), Akgüngör *et al.* (2010) and Kalashami *et al.* (2012) also identified that higher education consumers obtained would had higher demand on organic food. Two studies about organic food in Thailand also estimated higher demand for highly educated consumers (Sangkumchaliang and Huang, 2012; Roitner-Schobesberger *et al.*, 2008). Other findings, whereas, showed no significance (Owusu and Anifori, 2013; Li *et al.*, 2007; Cranfield and Magnusson, 2003) or even negative effect (Misra *et al.*, 1991; Buzby and Skees, 1994). An inverse relation between education and organic food demand was also found in the finding of Basarir and Gheblawi (2012). Especially, impact of education could reversely vary among demands on different organic prod-

ucts or graphical areas in the same one research. This case was mentioned in the study of Coulibaly *et al.* (2011), in which one negative sign of education on WTP was found in cabbage model in Ghana, but positive one for cabbage in Benin. Furthermore, education had no impact on WTP of organic tomato in both Ghana and Benin (Coulibaly *et al.*, 2011). Therefore, there may not be enough evidence to clarify a direct relationship between education level and demand on organic foods.

Contrary to our hypotheses, respondents' ages and their household size did not affect the demand on organic vegetables in this study. No evidence about impact of age on WTP was consistent with the estimates of Basarir and Gheblawi (2012), Owusu and Anifori (2013), Wahida *et al.* (2012) or Jolly (1991). However, Cranfield and Magnusson (2003) found that younger consumers (less than 35 years old) would be likely to buy more organic foods. Similarly, a higher demand on free-pesticide food belonged to young consumers (van Ravenswaay and Hoehn, 1991; Buzby and Skees, 1994). Ara (2002) only found a negative relationship between age and WTP for organic rice in Naga, not in Manila of the Philippines. Reversely, three studies in Thailand showed that consumers who bought organic food tended to be older than non-buyers (Somsak and Blut, 2012; Roitner-Schobesberger *et al.*, 2008; Sangkumchaliang and Huang, 2012). Another finding suggested younger people (aged 16–30) and the older (over 50 years old) would have higher demand on organic food, so one inverse U-shape distribution should be considered to express relationship between age and WTP (Xia and Zeng, 2008). Finally, household size which was not related to consumers' demand on organic vegetables also has no signal from the findings of Coulibaly *et al.* (2011), Basarir and Gheblawi (2012), Bhatta *et al.* (2009), Piyasiri and Ariyawardana (2002). Meanwhile, few studies found significant relationship between family size and WTP (Xia and Zeng, 2008).

The present study was done in big supermarkets in Hanoi whose consumers usually have higher income than that of the people around Hanoi as well as Vietnam as a whole; as a result, these estimates may not be generalizable to the small cities, rural areas. Another better way to generalize these results is to supplement samples from small cities and rural areas in the future. Besides, we only evaluated the consumer's willingness to pay for organic vegetables, not all organic foods, so the high amount of consumers' demand may be not fully correct for other organic ones.

Nevertheless, our study is considered the first comprehensive approach about organic foods' demand in Vietnam and has important marketing as well as policy implications. A high demand for organic foods indicates high potentials for the development of organic food in this country. This is also consistent with the report of Lan (2010), which showed that supply of organic vegetables could not meet demand. The results provide some useful recommendations to the government who wants to expand the organic market share. Specifically, providing information widely about organic vegetables with their

unique characters compared with conventional ones may be the most important task next time. It is necessary to help Vietnamese people to differentiate between organic and safe vegetables because many people do not know about organic food and they are still confused with safe products (Phuong, 2010). To persuade consumers to believe in the quality and safety of organic vegetables, the government should support and encourage organizations or institutions that provide certification and label for organic foods, such as Participatory Guarantee System (PGS) certification now for organic vegetables. Furthermore, the findings about consumers' factors influencing on WTP for organic vegetables also give important messages to retailers. A clear label with full information about organic vegetables will help them to understand well about organic character and benefits. Second, retailers may increase their share of organic market through opening new shops, attracting new customers through old consumers who already used organic ones. Finally, market segmentation by income groups should be considered to utilize consumers' demand and enlarge organic market share.

CONCLUSIONS

These findings show that market share of organic vegetables is very small because most of people have no adequate information about organic market, inconvenience to buy or uncertainty about quality and safety of organic foods. However, majority of Hanoi's consumers would be likely to pay higher price for organic over conventional vegetables. Most important factors that influence on WTP for organic vegetables are their concerned issues (price or safety and quality), income and organic consumed experience. Organic vegetable shops become the first priority choice of Hanoi's consumers to try and buy organic products.

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