Determinants of A Customer's Willingness to Pay (WTP) for Organic Fruits and Vegetables: An Empirical Study in the Bangkok Metropolitan Area

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Abstract—**Many people have become more interested in environmental products, paying more attention to their health and sanitation. The popularity of organic fruits and vegetables are increasing gradually and soon will become one of the top choices for people's consumption. However, the consumption of organic food is not as widespread as it should be in Thailand because the prices are unstable and usually more expensive than conventional food. This project's objective is to identify the factors affecting the willingness to pay (WTP) for organic fruits and vegetables in Bangkok and its metropolitan area by using the Contingent Valuation Method (CVM). Binary logistic regression and multiple regression are employed to determine the significant factors. Descriptive results from a willing to pay premium group indicate that the typical amount (median value) that they are willing to pay is up to 60 percent over the non-organic price. Recommendations are also discussed.**

Index Terms—**Binary regression, contingent valuation method, multiple regression, organic products, willingness to pay.**

I. INTRODUCTION

The key to living a healthy life is eating healthy with quality food that has no pesticides. Presently, a majority of the people are paying more attention to their health and sanitation. Thus, the popularity of organic products is increasing gradually and soon will become one of the top choices for people in taking care of their health, in terms of consumption. Although the world market of organic production and consumption is still small, it is believed to be growing rapidly. Up until recently, Thailand has enjoyed rapid growth in organic production. Statistics have shown an average annual growth of 39.9% since 1998, when national data became available for the first time. Although the past 5 years have shown a slow annual growth of about 18.5%, the Thai organic sector is still growing. The Thai organic market as a whole was estimated to be worth about 2,331.55 million Thai Baht (THB) (Euro 58.22 million) in 2014. Exports accounted for 77.9%, with the domestic market making up 22.06% (THB 514.45 million, which is equivalent to Euro 12.85 million) [1]. The main export destinations were the European Union, followed by the United States, and East Asian and Southeast Asian countries. In the domestic market, modern trade (59.5%) was the largest sales channel, followed by green shops (29%), and restaurants, cafés, and food services (5.9%). Starting in 2012, the National Organic Agriculture Committee was established to oversee policies, regulations, and strategic plans. The committee consists of different government organizations, for instance, the Ministry of Agriculture, the Ministry of Commerce, and the Ministry of Science and Technology [2]. Meanwhile, private sectors have played an important role in setting up standards through several organic certification services. In general, organic products refer to fruits and vegetables that are grown and produced using organic farming methods that are free from modified organisms and harmful pesticides [3]. Fruits and vegetables, labeled organic or certified organic, are usually available in supermarkets in Bangkok or major cities in Thailand. Non-certified organic fruits and vegetables are also sold in local markets. Organic products typically cost more than conventional fruits and vegetables [4].

The sales of health and wellness products continue to grow, as consumers increasingly demand healthy options and manufacturers also incorporate more health and wellness benefits into their product offerings. Reference [1] claimed that the production and sale of Thai organic products have enjoyed rapid growth year after year. The number of certified organic farms and lands has also shown a steady increase. The average growth of organic lands was more than 20% before 2011. The dominant characteristic of organic food in the consumers' mind is "healthy" [5]. This is positive because health concerns are an important factor in determining a consumer's buying decision. Many studies confirmed that consumers have positive attitudes towards organic products, and they are perceived as healthier than conventional alternatives [6]. Nevertheless, they are quite expensive, especially for the high quality or premium products sold in supermarkets. According to [7], there is an abundance of research showing that the cost of producing organic products is higher than that of conventionally-produced products. This is because organic products must meet the criteria of being organic. They must also be distinguishable from the conventional products and must be certified by a recognized agency. All these activities are expensive [8], and hence, are reflected in the production cost and prices of the organic products. In addition, organic farms carry higher production costs; they are labor-intensive and take a longer time to prepare and harvest produce. According to [9], local organic products have about 10 to 50 percent premium prices in Thailand. A recent survey found that typical conventional carrots cost 30 Thai Baht per kilogram, while organic carrots can cost at least 60 Thai Baht for the same amount.

Even though organics products have higher prices,

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consumers are increasingly aware of the negative consequences of conventional farming and are consuming organic products [7]. They are willing to pay a higher price for premium, harmful-chemical-free food. According to [10], on average, organic foods were 47 percent more expensive. In fact, depending on shopping location, the research found organic lettuce, carrots, maple syrup, olive oil, and cream cheese for the same price or less than their conventional counterparts. Hence, prices can change dramatically by many factors that make it difficult to evaluate the actual value of produce that is labeled as organic. In Thailand, there are only a few studies relating to the pricing of organic products. This research investigates the willingness to pay (WTP) for organic fruits and vegetables, and identifies significant factors affecting the intention of people to buy organic fruits and vegetables. Bangkok and its metropolitan area are chosen because the supermarkets that sell organic products are mostly in this area. In addition, people who live in this area have a higher average income than in other parts of Thailand.

II. CONCEPTUAL FRAMEWORK

A. Willingness to Pay (WTP) and Contingent Valuation Method (CVM)

Willingness to pay (WTP) is the maximum amount that an individual is willing to sacrifice in order to obtain something or avoid something undesirable .This resembles the standard economic view of the consumer reservation price. According to [11], WTP estimates are derived from actual demand data. The willingness to pay is a methodological tool that seeks to estimate the capacity to pay of certain social groups in a search to find the hypothetical monetary value [12]. Moreover, according to [13], a consumer's willingness to pay is the maximum that a consumer wants to pay for a product when there are no borrowing constraints. The ability to pay and the willingness to pay are different concepts. A consumer who derives a high benefit from the consumption of a product may be willing to pay an expensive price even though his or her budget is limited. The ability to pay is a constraint on a consumer for making decisions according to his or her willingness to pay. In this research, the focus is the willingness of the consumer to pay for organic fruits and vegetables.

According to the research in [14], the ability to measure WTP enables the calculation of the demand curve according to price and to set a price that offers the best possible margin. When prices can be customized, knowing the WTP could enable optimization of both sales volume and sales margin. The concept first appeared in the economic literature many years ago [14]. WTP and its methods were designed to determine the prices for pure public goods and services.

WTP studies for various countries or regions are not comparable since preferences are different. Generally speaking, preferences are derived from an individual's circumstances, which include education, culture, income, health, environment, etc. The factors that affect preferences vary from one region or country to another [12]. According to [15], various researchers have employed different techniques, such as contingent valuation, choice experiments, and hedonic pricing, to measure the WTP. In contingent valuation surveys, hypothetical markets are set up in which consumer WTP is solicited by asking respondents to value products, contingent on the available market. Where market prices already exist for a product, contingent valuation surveys tend to focus on the premiums that consumers are willing to pay for the product. Reference [16] used contingent valuation and analyzed consumer WTP for pesticide-free fruits and vegetables in the United States of America. In addition, [17] employed contingent valuation and found that the willingness of consumers to pay premiums for organic fruits and vegetables was high in Spain. There are a variety of methods and techniques but contingent valuation appears to be the most suitable one. Reference [18] stated that the contingent valuation technique has great flexibility, allowing the valuation of a wider variety of non-market goods and services than is possible with any of the indirect techniques. In addition, CVM is based on economic utility theory and can produce reliable estimates; most biases can be eliminated by careful survey design and implementation [18].

B. Variables and Their Relationships

There are many variables that consumers consider when they are paying a premium. The variables employed in this research is summarized in Table I. According to [19], more information on the organic food market increases consumers' organic food knowledge. This is important because this positively influences consumers' attitudes towards organic food products. According to [20], recent evidence suggests that relatively low-cost, green behaviors may act as a gateway to more significant and more committed pro-environmental behavior, such as habitual recycling or expressing support for alternative energy sources. This means that green behaviors or green morality have a positive impact on attitudes in terms of helping customers to buy green products. The results of [21] confirmed that consumers have positive attitudes towards organic products. This is a common (mentioned) reason for purchasing organic products. Therefore, attitude is a factor that increases the positive effects of WTP for customers.

In addition, [22] stated that certain segments of the population are willing to pay more for food products carrying safety and quality characteristics, certified as being present by a trusted source. Customers want to buy organic products if they are safe and certified. Reference [23] stated that healthfulness was the most important attribute cited by organic purchasers.

In this research, the focus is also on gender, income, and age in the demographic category. According to the work of [15], income variables (higher and middle income) are expected to be positively related to the WTP premiums for organic fruits and vegetables, compared to conventional ones. There is evidence that gender affects the willingness to pay. Females, in particular, are more willing to pay higher premiums for safe foods [15]. In summary, the demographics are significant factors that affect the willingness to pay.

Moreover, in the food industry, an important factor that affects a customer's decision is the product appearance and quality. According to [15], physical appearance, including freshness, cleanness, size, with less insect damage of organic fruits and vegetables are product attributes that have positive effects on WTP premiums.

TABLE I: VARIABLES AND THEIR DESCRIPTIONS

Variables	Descriptions
Trust	In this research, trust is the creditability that a consumer has for a seller, to increase the potential to buy the organic product.
Demographics	For instance, age and income
Green Behavior	Green behavior is a behavior having a high positive interest or awareness of environment effects. Therefore, it is a behavior that minimizes harm to the environment as much as possible, or even benefits it [24].
Attitude	Attitude is self-interest for organic products. It indicates that a consumer focuses on organic rather than conventional products. A good attitude toward organic products affects the willingness to pay in a positive direction while a negative attitude toward an organic product leads to a negative impact on the willingness to pay.
Willingness to Pay	0 = not willing to pay 1 = willing to pay, and it is the maximum amount that an individual is willing to pay for organic fruits and vegetables.

TABLE II: EXAMPLES OF STATEMENTS

Section	Statement
Trustworthiness toward buying organic fruits and vegetables	1) Knowing the manufacturing process helps to increase the trustworthiness for the consumer in buying the organic fruits and vegetables.
	2) A certified label or seal of approval helps to increase the confidence and trustworthiness in buying the organic fruits and vegetables.
Benefits of organic fruits and vegetables	1) Consuming organic fruits and vegetables bring great benefits to our health.
	2) Organic fruits and vegetables do not have harmful chemical residues.
Attitude towards organic fruits and vegetables	1) Organic fruits and vegetables have higher nutritional value than normal fruits and vegetables.
	2) Consuming organic fruits and vegetables has no risk of bringing harmful chemicals into the body.

III. METHODOLOGY

A. Method of Approach and Data Collection

Two research methods are employed in this study. One is documentary research from literature surveys, journals, articles, previous research works, and case-studies related to WTP for organic fruits and vegetables. The second method is survey research. Surveys are done by means of questionnaires. The population is people who live in Bangkok and its metropolitan area. They must be at least 18 years old and have a part in making decisions to buy food for a household. The topics addressed include the demographics, benefits, trust, and attitudes that contribute to the willingness to pay for organic fruits and vegetables. The minimum sample size with 95 percent confidence is 400.

The questionnaire consists of multiple-choice questions, open-ended questions, check-list questions, statements for agreement, and a five-point Likert scale, divided into four parts as follow:

PART 1: The first part of the questionnaire is about demographic information. Questions include gender, age, education, occupation, income, and places of food consumption. It also includes questions regarding organic fruits and vegetable consumption, frequency of label reading, and exercising.

PART 2: The second part of the questionnaire is about the willingness to pay for organic fruits and vegetables. There are statements evaluating whether the respondent is interested or willing to pay for organic fruits and vegetables or not, as summarized in Table II.

After this part, the respondents have to answer three additional questions that measure the green behavior of each person. The questions include using tote bags/plastic bags, trash separation, and participating in environmental-related activities.

B. Econometric Model Specification

Two models are used in this research to estimate the determinants of the willingness to pay for organic fruits and vegetables. The dependence for the first model is based on whether they are willing to pay for recycling. The dependence for the second model is based on the amount of the willingness to pay. The econometrics model shows the role of socioeconomics and demographic factors in explaining the willingness to pay for organic produce. The first and second models are estimated by (1) and (2), respectively.

$$D_{WTP} = \hat{X}\beta + e \qquad (1)$$

$$WTP = \hat{X}\beta + e \qquad (2)$$

D_{WTP} represents a vector of values from the dependent variable. It is a dummy variable, where 0 implies that a respondent is not willing to pay for organic products and 1 implies otherwise. Furthermore, WTP is a vector contains the maximum amount that people are willing to pay for a product. $\hat{X}$ represents a matrix containing exploratory variables. β represents a vector of regression coefficients, and e represents a vector of residuals.

Several statistical techniques are applied to analyze the collected data. Factor analysis is applied to 5-point Likert scale problems to explore the possibility of grouping and reducing the dimensions of the exploratory variables. Reliability analysis is also used to test the reliability as internal consistency [25]. After that, binary logistic regression is employed to determine the significant factors affecting the WTP for organic products or not. The logistic model is the transformation of the dependent variable (D_{WTP}), expressed as odds, using logit, which is the natural logarithm of odds. Logistic regression does not require many assumptions. The data for a dependent variable has to be categorical and generally dichotomous. In addition, logistic regression can be applied with a mix of variables, continuous and categorical. The distribution of data can be either nicely or not nicely distributed or both, so there are no assumptions on the distribution of independent variables [26].

Multiple linear regression (MLR) is also used for the second model, where the dependent variable is the maximum amount that people are willing to pay for organic products. MLR is used for predicting the unknown value of a variable from the known value of two or more variables, known as predictors. In this research, the significant factors affecting the WTP for organic food are determined. All assumptions are validated to support the outcome of the estimated model.

TABLE III: SUMMARY OF THE CHARACTERISTICS OF THE RESPONDENTS

Variables	Categories	f	%
Buying Decisions	0 = No	20	5
	1 = Yes	380	95
Gender	1 = Male	151	37.75
	2 = Female	249	62.25
Age (years)	Range	18-66	-
	Average	38.48	-
	Median	38	-
	Standard deviation	12.12	-
Education Level	1 = Vocational or equivalent	53	13.25
	2 = Diploma or equivalent	51	12.75
	3 = Bachelor's Degree	267	66.75
	4 = Master's or higher degree	29	7.25
Monthly income (Thai Baht)	1 = Less than 15,000 Baht	51	12.75
	2 = 15,001 - 30,000 Baht	136	34
	3 = 30,001 - 45,000 Baht	79	19.75
	4 = 45,001 - 60,000 Baht	89	22.25
	5 = More than 60,000 Baht	45	11.25
Prior Organic Consumption	0 = Never consumed	31	7.75
	1 = Have consumed	369	92.25
Organic Consumption Frequency	1 = Once in a while	173	46.88
	2 = 1 - 2 days per week	91	24.66
	3 = 3 - 4 days per week	58	15.72
	4 = 5 - 6 days per week	38	10.3
	5 = Everyday	9	2.44
Nutritional Reading Habit	0 = Never read at all	29	7.25
	1 = Read sometimes	141	35.25
	2 = Read most of the time	121	30.25
	3 = Read every time	109	27.25
Exercise frequency	0 = Do not exercise	35	8.75
	1 = Once in a while	101	25.25
	2 = 1 - 2 days per week	119	29.75
	3 = 3 - 4 days per week	77	19.25
	4 = 5 - 6 days per week	24	6
	5 = Everyday	44	11
Interested and willing to pay	0 = Not interested and not willing to pay	67	16.75
	1 = Interested and willing to pay	333	83.25

IV. RESULTS

A. Descriptive Results

The total collected sample size is 430, but 30 of them are incomplete; thereby, 400 sets of samples are used in the analysis. The characteristics of the respondents are summarized in Table III. Most of the respondents are responsible for making decisions in buying food/groceries

and 62.25 percent are female. They have earned a Bachelor's degree (66.75%), and only a few have a Master's degree (only 7.25%). The range of their monthly income is mostly from 15,000 Thai Baht up to 30,000 Thai Baht. Furthermore, more than 90 percent of them have consumed organic fruits and vegetables before. However, more than half of them have consumed organic fruits and vegetables only once in a while or 1-2 days per week. Only about 2 percent of respondents have consumed them on a daily basis. Most of the respondents are in the neutral healthy zone, meaning that they mostly exercise only 1-2 days per week, not too much and not too little. Moreover, more than 80 percent (83.25% or 333 people out of 400) of the respondents are interested and willing to pay to consume organic fruits and vegetables.

B. Exploratory Factor Analysis

Thirteen items that respondents answered on a 5-point Likert scale are analyzed using the principal component method with varimax rotation. The dimensions are reduced to 3 components with an acceptable total variance (explained) of 67.77 percent (more than 60 percent). A KMO value of 0.86 and a significant Bartlett's test support that the 14 items are related and suitable, to apply exploratory factor analysis. The results of the three groups are summarized in Table IV.

TABLE IV: RESULT OF FACTOR ANALYSIS

Factor	Mean	Factor loading	Variance Explained (%)
Factor 1: Attitude			35.214
Good for body and physical appearance	4.195	0.862	
Good for health	4.228	0.860	
Harmful-chemical-free	4.085	0.861	
Higher nutrient value	3.765	0.863	
No pesticides	4.020	0.860	
Higher quality	4.104	0.859	
Factor 2: Trust			20.955
Production sources	4.278	0.872	
Production process	4.325	0.871	
Label of "organic" on a package	4.335	0.868	
Confidence in label on a package	4.398	0.868	
Factor 3: Green Behavior			11.601
Reduce and reuse plastic bags	2.245	0.886	
Waste separation	2.403	0.890	
Green and environmental activities	1.810	0.888	
Total Variance Explained			**67.770**

C. Binary Logistic Regression Model

The data of 400 respondents who are making decisions in buying fruits and vegetables are analyzed using binary logistic regression, to determine the significant factors influencing them to be interested in and willing to pay for organics fruits and vegetables. The parameters of the binary logistics model are estimated using the maximum likelihood method, which means that the coefficients that make the

observed result or dependent valuable most likely are selected. SPSS version 20 is used to compute the probability that the dependent variable (dichotomous variable of willing to pay or not) would occur. One way of accessing the goodness of fit is to examine how 'likely' the sample results are. The probability of the observed results, given the estimated parameter, is known as the "-2 log-likelihood". The "-2 log-likelihood" (-2LL) is far from zero, however, because there is no upper boundary for -2LL. In this case, the final -2LL is 188.02 which is less than the initial -2LL (284.393). The reduction in differences between the final and initial -2LL indicates that the model has a good fit by using binary logistic regression. In addition, the Cox & Snell R squared and Nagelkerke R squared are 22.40% and 42.5%, respectively. In easy terms, this means that the probability of people willing to pay is equal to 22.4% for the Cox & Snell R squared and 42.5% for the Nagelkerke R squared. The Hosmer and Lemeshow Test shows the goodness of fit of the model with a Chi-square of 6.449 and significance value = 0.597, so the null hypothesis of the model is accepted. Furthermore, testing the fitness of the model by comparing the predicted value and the actual value indicates that the overall prediction rate of the model is 90.5 percent, which is excellent.

There are four significant variables that influence the WTP. They are the prior experience of organic consumption, attitude toward organic products, trust, and green or environmentally-friendly habits. Demographic characteristics, such as age and gender, are not significant to separate people into two groups of willing and not willing to pay for organic products. The coefficients and Wald statistics are summarized in Table V.

TABLE V: BINARY LOGISTICS RESULTS

Variables	B	S.E.	Wald	Exp(B)
Prior experience of organic consumption	2.546	0.520	24.136***	12.756
Trust in "organic"	1.025	0.350	8.724***	2.787
Green behavior	0.940	0.360	7.016***	2.559
Attitude toward "organic"	1.033	0.300	11.719***	2.809
Constant	-10.190	1.690	36.368	0

*** $p < 0.01$

Using the odds multiplier when the other factors in the model are constant, people with prior experience of consuming organic fruits and vegetables are 12.7 times more likely to pay for them than people who have never tried organic products. Having trust in organic products leads to about a 280 percent increase in the odds of willingness to pay. In addition, having green behavior, such as regular waste separation, leads to a 255 percent increase in the odds of willingness to pay. Having a good attitude toward organic products leads to a 280 percent increase in the odds of willingness to pay.

D. Multiple Regression Analysis Model

The equation for multiple linear regression describes the statistical relationship between the dependent and independent valuables. The dependent variable is the quantitative amount of money that people are willing to pay

(more) for organic products. Significant variables affecting the amount of premium that people are willing to pay for organic fruits and vegetables are summarized in Table VI. Outliers are checked, and there are no outliers in the dataset before running the model. The Durbin-Watson (DW) value is 1.85, which is close to a perfect value of 2. The VIF of each variable is much less than 5, hence, multicollinearity does not exist.

TABLE VI: MULTIPLE REGRESSION RESULTS

Variables	Standardized Coefficients	t		VIF
Constant		-3.09	***	
Gender x_1	-0.114	-2.43	***	1.07
Monthly income x_2	0.222	4.312	***	1.29
Frequency of organic consumption x_3	0.215	4.343	***	1.29
Frequency of reading nutritional labels x_4	0.166	3.248	***	1.27
Frequency of exercising x_5	0.243	4.784	***	1.26
Green Behaviors x_6	0.154	3.081	***	1.22

*** $p < 0.01$

The regression can be found by (3) from the amount of premium. The WTP for organic products (*Y*) depends on six variables (x_i), where *i* is from 0 to 6.

$$Y = -38.614 - 12.43\,x_1 + 9.659\,x_2 + 9.667\,x_3 + 9.867\,x_4 + 9.439\,x_5 + 13.888\,x_6 \quad (3)$$

Males are willing to pay 12.43 Thai Baht more for organic fruits and vegetables than females. The income level and the WTP move in the same direction as a higher income leads to higher WTP. In addition, each additional consumption level of organic products leads to a 9.667 Baht increase in the WTP. People who regularly read nutritional labels pay 9.867 Baht more than people who seldom read them. The frequency of exercising has a positive impact on the amount of WTP. Similarly, practicing green habits has a positive impact on the amount of WTP.

V. CONCLUSION

Among all variables involved in this study, only four variables are significant for predicting whether people are willing to pay premiums for organic fruits and vegetables. The most powerful impact is whether people have prior experience in organic consumption. This indicates that once people have tried organics products, they are more likely to pay for them again. Other significant variables separating people into two groups, willing to pay and not willing to pay, are trust, attitude towards consuming organic products, and their regular environmental practices. Descriptive results from the willing to pay premium group indicate that the typical amount (median value) that they are willing to pay is up to 60 percent higher than conventional fruits and vegetables. However, when further analysis is done on the willing to pay group based on the amount of premium they are willing to pay, gender and monthly income are two

demographic characteristics that significantly affect the amount of money they are willing to pay. The variable that has the most influence on the amount of WTP is the frequency of exercising. People who exercise often are willing to pay a higher amount than people who seldom exercise. In fact, frequency of exercise, frequency of consuming organic fruits and vegetables, and monthly income have positive impacts on the amount of WTP. Green behaviors and frequency of reading nutritional labels have relatively the same positive impacts on the amount of WTP, as their standard coefficients are close to each other. However, gender has the least impact on the amount of WTP, as its standard coefficient value (absolute value) is the least, with males willing to pay more than females.

A key indicator, from the results of the two models, is the prior experience of organic products consumption. Past experience and frequency of consuming organic products significantly affect the willingness to pay and the amount they are willing to pay. To stimulate the demand for organic fruits and vegetables, it is important to encourage people who have never tried organic products to try them, so they have experience with organic products. Once they have tried them, the higher frequency of consuming organic products leads to higher WTP. Most of all, people who are concerned about their health and environment are people who are willing to pay more for organic products.

CONFLICT OF INTEREST

The author declares no conflict of interest.

AUTHOR CONTRIBUTIONS

SS conducted the research, analyzed the data, and approved the final version of this research paper.

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