Consumers' willingness to pay and factors affecting pesticide-free rice buying: case study of Phayao Province consumers

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Abstract

This study aimed to explore price levels and factors affecting willingness of the consumers to pay for pesticide-free rice by using consumer samplings of 400 participants in Mueang District, Phayao Province. The methods used for this study are Contingent Valuation Method in type of Double Bounded CVM together with Multinomial Logit Models.

The result reveals that consumers are willing to pay 12.73 Baht per Kilogram to consume pesticide-free rice. Factors affecting consumers' willingness (to pay) that have statistically significance at confident interval of 95% consist of 6 aspects. Factors which are according to the hypothesis of the study include: 1) education level, 2) experience in consumption of pesticide-free or other organic products, and 3) price strategy; while factors that are not relevant to the hypothesis include 4) consumers' members in the family, 5) communication and 6) income of the households.

It is found from this study that pesticide-free rice is a product that has potential for growth among community markets.Senior people have more influential factor (in willingness to buy) than other family members. Communication toward the consumers by traditional modes (e.g. radio broadcasting, community radio) is more efficient than modern media (on-line media.)

Keywords: Marketing Approach, Pesticide Free Rice, Willingness to Pay.

1. INTRODUCTION

Nowadays trend in environment-friendly agricultural products is widely accepted among Thai producers and consumers. This can be seen from department of health in designing labels for pesticide-free agricultural products such as vegetable and fruits, including campaigns from government and private sectors to people to consume these products continuously. As reflected from more amounts of land areas for growing crops and higher market value, rice is considered the first product in this field.

Phayao province is considered an important area in rice growing of Thailandand. DokKhamtai District is important producing area.Rice is important economic crop as having most amounts of growing land areas and households involved. So, the major occupation of DokKhamtai residents is rice agriculturists. Most of them use chemicals (including pesticides) to increase amounts of product. However, problems can emerge later i.e. pesticide residue remains both in the soil and in the products. The products also have tendency to decrease in a long term.Nevertheless, some agriculturists in the area have attempted to solve the problem by growing pesticide-free rice which would reduce pesticide residue problem and increase the product amount in a long term, and also increase value for the product as expecting that price for selling pesticide-free rice would be higher than normal one. Additionally, agriculturists would have higher income. Moreover, producing pesticide-free rice can be considered as sustainable agriculture according to sufficiency economy relating to agricultural product, focusing on balance and sustainability, resulting in better quality of life.

As for pesticide free rice, this was considered a new product both for agriculturists and consumers in Phayao. Marketing and consumers' interest were not clear at that time, agriculturists were not sure to increase this product. So, producing for commercial purpose did not occur although some agriculturists were interested. Most of them still chose to grow normal rice, reducing opportunity to make more revenue from producing product that they excel.

Therefore, there should be a study to know the price and factors that affect willingness to pay for pesticide-free rice. Result of this study should reveal to the agriculturists about appropriate selling price for consumers' demand; and relevant organization can make a suitable plan to increase market value which would eventually bring higher revenue to agriculturists in DokKhamtai District, Phayao

2. Scope of study

1) This study focuses on consumer group residing in Mueng District of Phayo Province.

2) Pesticide-free rice means jasmine rice which may have some chemicals residue but remaining residue is lower than standard set by Thai National Bureau of Agricultural Commodity and Food Standards.

3. Population and sampling

Population in the study include person who are always responsible in buying rice for their households. Sampling size was calculated by formula of Taro Yamane at confidence level of 95%. It is found that sampling size would be 397 persons but researcher rounded a number up to 400. This was Accidental Sampling Method. Main places for interview include convenient stores, supermarket, fresh market, walking street and other places that have many consumers

4. Research methodology

Structured interview questionnaire was used by making Pre-survey of 100 sampling before making real questionnaire in order to know appropriate start bid price, questions, and finally major mode of start bid price are 4,9,14 and 19 baht. Overall 400 questionnaire forms are divided into 4 mode of each start bid prices for better sampling distribution. Each mode is for 100 samplings.

5. Data collection

The study employs Accidental Sampling. Consumers would not know which mode of start bid price they would be in. An interview happened during October - December 2016

6. Data analysis

For knowing additional prices that consumers are willing to pay for pesticide-free rice, Researcher applied the concept of Contingent Valuation Method in type of Double Bounded: CVM. Results from decision would be in 4 cases i.e. YesYes(YY: accept the price at first and second offer: willing to buy definitely), YesNo(YN :accept the price at first sight but not accept second price: willing to buy at the price at first only), NoYes(NY: not accept the price at first but accept second price which was reduced: willing to buy at second price), and NoNo(NN: not accept the price at first and second: not willing to buy definitely). Each case has reference of start bid price as shown in Table 1.

Table1: reference of start bid price of each case.

	Reference price in case of			
	YY	YN	NY	NN
Incase start bid price be 4 baht	8	4	2	0
Incase start bid price be 9 baht	18	9	4.5	0
Incase start bid price be 14 baht	28	14	7	0
Incase start bid price be 19 baht	38	19	9.5	0

For example, if customers got start bid price at 4 baht, they would be asked first that if pesticide free rice is more expensive than normal one 4 baht per kg., would they be willing to pay. If the answer is "yes", then the second question is if the price is 4 baht higher per kg. (combining with first question, it would become 8 baht / kg.) would they be willing to pay. If they still answer "yes", this would be called YY case and reference price for the decision is 8 baht. If they firstly agree while say "no" to second offer, this would be called YN case and reference price for the decision is 4 baht. If they firstly not agree but when asked a second question, rising price is down to 2 baht(from previously 4 baht),and they say "yes", this would be called NY case and the reference price for the decision is 2 baht. But if they say "no" to both first and second questions, this would be called NN, and the reference price for the decision is 0 baht. In case of start bid price is 9, 14 or 19 baht, the similar method would be employed.

Probability of each decision would be as following equation.

Prob(YY)+Prob(YN)+Prob(NY)+Prob(NN)=1

So, average willingness to pay price would be

Mean WTP = $\square$(nij x pij) / $\square$nij (1)

By setting as following

n = number of customers in several modes of decision

i = cases that customers chose, consisting of i=1 as YY, i=2 as YN, i=3 as NY, i=4 as NN

j = start bid price as set in questionnaire, consisting of j=1 as start bid price of 4 baht, j=2 as start bid price of 9 baht, j=3 as start bid price of 14 baht, j=4 as start bid price of 19baht.

pij = reference start bid price of each case, consisting of the following.

p11=8 baht, p21 =4baht, p31 =2 baht, p41=0 baht

p12= 18baht, p22 = 9baht, p32 = 4.5baht, p42= 0baht

p13= 28baht,p23 = 14baht,p33 = 7 ubaht, p43= 0baht

p14=38baht, p24 = 19baht, p34 =9.5baht, p44=0baht

7. Variables and Hypothesis

Variable WTP is form of choices, consisting of 4 alternatives i.e.YY,YN,NY and NN depending on consumers' decision.

Variable Edu is education level. The researcher hypothesizes that those who got bachelor or higher degree have more probability to buy pesticide free compared to those with lower educational qualification.

Variable Inc is household income. The researcher hypothesizes that high income households have more probability to buy pesticide free compared to low income households.

Variable Exp is the experience in other pesticide-free or organic products. The researcher hypothesizes that if the consumers have such experience, they are more probable to buy pesticide-free rice than those who don't have such experience.

Variable Chil is members in the households. The researcher hypothesizes that consumers that give importance to their children would have more probability to buy pesticide-free rice compared to those who give importance to other members in their households.

Variable Info is marketing communication factor.The researcher hypothesizes that modern media (online media) would reach consumers better than traditional media (e.g. radio broadcasting, community radio.)

Variable Pack is the design of packaging. The researcher hypothesizes that beautiful packaging would attract consumers to buy the product easier than product in less-beautiful package.

VariblePri is sale strategy. The researcher hypothesizes that reducing the price would make consumers easier to buy the product.

Variable Cha is channeling strategy. The researcher hypothesizes that sellers have the products available at their stores and can give it to customers at that time, this would help customers easier to decide to buy rather than not having the product available or making an appointment to receive the product later.

Variable Pro is promotion strategy. The researcher hypothesizes that having campaigns for consuming pesticide-free rice would be good for decision to buy the product. Consumers would feel easier to buy it more than without campaigns.

Variable Comp is the comprehension knowledge about pesticide-free rice. The researcher hypothesizes that if consumers know a lot of pesticide-free rice, there would be more probability to buy it than those with little knowledge about pesticide-free rice.

However, the analysis would bring into account in pair only cases of 1) YY (accept the price at first and second offer: willing to buy definitely) compared with base case NN (not accept the price at first and second: not willing to buy definitely); and 2) NY (not accept the price at first but accept second price which was reduced: willing to buy at second price) compared with base case NN (not accept the price at first and second: not willing to buy definitely).

8. Result of the study

To find willingness to pay price for pesticide free rice compared to one kg. of normal rice, by using primary data from questionnaire analysis using the concept of Contingent Valuation Method in type of Double Bounded CVM, and when bringing this to calculation in equation (1), willingness to pay price is 12.73 baht/kg.

To study factors affecting willingness to pay by using Multinomial Logit Models which was made and used by Stata computer program to estimate parameter values, by paring comparison with base case NN, the result can be shown as follow.

Table2: pairing comparison of probability of willingness to pay.

	Case YY				Case NY			
	Exp(b)	Std.Err	Wald Static	P>|z|	Exp(b)	Std.Err	Wald Static	P>|z|
Edu	2.26	0.62	2.22	0.004***	2.47	1.01	2.22	0.026**
Inc	1	0	2.6	0.009***	1	0	-0.14	0.888
Exp	4.89	1.78	4.31	0.000***	1.3	0.61	0.58	0.561
Chil	0.39	0.15	-2.47	0.014**	0.39	0.24	-1.54	0.123
Info	0.44	0.16	-2.29	0.022**	0.33	0.21	-1.76	0.079
Pack	1.87	0.16	1.29	0.198	0.7	0.13	-1.85	0.064
Pri	1.49	0.28	2.14	0.033**	1.93	0.51	2.6	0.009***
Cha	0.95	0.15	-0.32	0.75	0.68	0.16	-1.66	0.097
Pro	1.01	0.14	0.1	0.922	1.58	0.32	2.21	0.027**
Know	1.33	0.21	1.83	0.067	1.15	0.25	0.65	0.517
_cons	0.03	0.02	-4.59	0	0.05	0.05	-2.87	0.004
Obs	=	400			Loglikelihood		=	400
LR Chi2	=	109.91			Pseudo R2		=	0.1128
Prob>chi2	=	0			Base Case		=	NN

Source: from calculation

Remarks : *** significant level at99 %

** significant level at95 %

Table 2 Case YY compared with NN.

This reveals factors affecting decision to buy pesticide-free rice in case of YY (accept the price at first and second offer: willing to buy definitely) with base case is NN (not accept the price at first and second: not willing to buy definitely.)

Result of this case points out that factors that statistically significant affect decision to buy comprise 6 factors. Education level, experience in consuming other pesticide free or organic products, and sale strategy correlate positively with decision to buy and according to hypothesis. But members in households and marketing communication correlate negatively with decision to buy, not according to hypothesis. Moreover, household income has no correlation with decision to buy while factors that have no statistically significant consist of design of package, channeling strategy, promotion strategy, the campaigns, and the comprehension about pesticide free rice.This can be elaborated as follow.

Education: those who earned bachelor degree or higher have more probability to buy more as the level of 2.24 time or increase of 124 per cent compared to those with lower education level. This may be because of higher education helps consumers realizes the value of pesticide-free rice, resulting in those consumers' willingness to pay for consuming it.

Experience in consuming pesticide-free or other organic products: those who are used to have this experience have more probability to buy as the level of 4.84 time or increase of 384 per cent compared to those who are no used that experience. It could be inferred that recognizing and familiarizing with consuming other pesticide free or other organic products made it easier to accept pesticide free rice which is a similar characteristic product.

Sale strategy: reducing price in case of buying large amount would make consumers decide to buy more at the level of 1.49 time or increase of 49 per cent compared to having no reducing price strategy and this is according to marketing strategy in term of price.

Members in the households: consumers who give importance to children in their families have less chance to buy atthe level of 0.39 time or 61 per cent down compared to consumers who give importance to other members in their families e.g. senior members. So, correlation type is not according to hypothesis. It is found that this has negative relationship possibly because consumers may perceive that senior members have less immunity and more exposure to get toxin from rice with chemicals more than children.

Marketing communication: consumers who got information about pesticide free rice from online media have less chance to buy atthe level of 0.44 time or 56 per cent down compared to consumers who knew the information from traditional media (e.g. radio broadcast, community ratio). Correlation type is not according to the hypothesis (negative relationship). This may be because consumers in Phayao still have low use of internet, together with traditional media e.g. television or radio is still popular and easier to receive for consumers.

Household income: higher income does not affect decision to buy pesticide free rice. Correlation type is not according to the hypothesis. This may be because pesticide free rice is similar to necessary commodities which value of flexibility of necessary commodities is equal to 0.

Design of packaging: good-looking packaging would cause consumers to decide to buy more at the level of 1.87 time or increase of 87 per cent compared to non-good looking packaging. This may be because nowadays pesticide free producers give importance to designing packaging both for attractiveness and to inform about benefits of the product. Packaging is not just for putting in product as in the past, but also includes acting as public relation about product, this helps consumer easier to decide to buy. However, result of this factor does not have statistical significance. That may be because other variables cause more significance but are not includedin the model.

Channeling strategy: consumers who get product after paying have less chance to buy the product at the level of 0.95 time or 5 per cent down compared to consumers who can wait for the product. Correlation type is not according to the hypothesis (negative relationship). This may be because consumers know well that pesticide free rice has a long tight process of production than other normal rice. To ensure to get safer rice, consumers are willing to wait for the product later. However, result of this factor does not have statistical significance. That may be because other variables cause more significance but are not included in the model.

Promotion strategy: having campaigns for consuming pesticide free rice would cause consumers to buy more at the level of 1.01 time or increase of 1 per cent compared to having no such strategy. This may be because there are more forms and channels of campaigns which reach target groups easier than in the past. This makes consumers feel that campaigns affect their decision to buy. However, result of this factor does not have statistically significance. That may be because other variables cause more significance but are not included in the model.

Comprehension about pesticide free rice: those who know well about pesticide free rice have more chance to buy at the level of 1.33 time or increase of 33 per cent compared to those with less understanding. This may be because they know well the benefit of consuming pesticide free rice, so they

decide to by this kind of rice. However, result of this factor does not have statistical significance. That may be because other variables cause more significance but are not included in the model.

Table 2 Case NY compared with NN.

This reveals factors affecting decision to buy pesticide-free rice in case of NY (not accept the price at first but accept at second price which was reduced: willing to buy definitely) with base case is NN (not accept the price at first and second: not willing to buy definitely.)

This study reveals that factors affecting decision to buy (statistically significant) include education level, sale strategy and promotion. These all correlate positively with buying decision according to the hypothesis. Factors that are not statistically significant include household income, experience in consuming pesticide free or other organic products, members in households, marketing communication, design of packaging, channeling strategy and comprehension about pesticide free rice. They can be explained as following.

Education: those who have bachelor or higher degree haveprobability to buy more as the level of 2.48 time or increase of 148per cent compared to those with lower education level. This may be because of higher education helps consumers realizes the value of pesticide-free rice, resulting in those consumers' willingness to pay for consuming it.

Sale strategy: reducing price in case of buying large amount would make consumers decide to buy more at the level of 1.97 time or increase of 97per cent compared to having no reducing price strategy and this is according to marketing strategy in term of price.

Promotion strategy: having campaigns for consuming pesticide free rice would cause consumers to buy more at the level of 1.58 time or increase of 58per cent compared to having no such strategy. This may be because there are more forms and channels of campaigns which reach target groups easier than in the past. This makes consumers feel that campaigns affect their decision to buy.

Household income: higher income does not affect decision to buy pesticide free rice. Correlation type is not according to the hypothesis. This may be because pesticide free rice is similar to necessary commodities which value of flexibility of necessary commodities is equal to 0. However, result of this factor does not have statistical significance. That may be because other variables cause more significance but are not included in the model.

Experience in consuming pesticide-free or other organic products: those who are used to have this experience have more probability to buy as the level of 1.31 time or increase of 31per cent compared to those who are no used that experience. It could be inferred that recognizing and familiarizing with consuming other pesticide free or other organic products made it easier to accept pesticide free rice which is a similar characteristic product. However, result of this factor does not have statistical significance. That may be because other variables cause more significance but are not included in the model.

Members in the households: consumers who give importance to children in their families have less chance to buy at the level of 0.40 time or 60 per cent down compared to consumers who give importance to other members in their families e.g. senior members. So, correlation type is not according to hypothesis. It is found that this has negative relationship possibly because consumers may perceive that senior members have less immunity and more exposure to get toxin from rice with chemicals more than children.However, result of this factor does not have statistical significance. That may be because other variables cause more significance but are not included in the model.

Marketing communication: consumers who got information about pesticide free rice from online media have less chance to buy at the level of 0.33time or 67 per cent down compared to consumers who knew the information from traditional media (e.g. radio broadcast, community ratio). Correlation type is not according to the hypothesis (negative relationship). This may be because consumers in Phayao still have low use of internet; together with traditional media e.g. television or radio is still popular and easier to receive for consumers. However, result of this factor does not have statistical significance. That may be because other variables cause more significance but are not included in the model.

Design of packaging: good-looking packaging would cause consumers to decide to buy less at the level of 0.70time or decrease of 30 per cent compared to non-good looking packaging. Correlation type is negative relationship which is not according the hypothesis. This may be because this group of consumers feel that packaging is not a real part of product quality but would increase higher selling price.So they decide not to pay more for this issue. However, result of this factor does not have statistical significance. That may be because other variables

cause more significance but are not included in the model.

Channeling strategy: consumers who get product after paying have less chance to buy the product at the level of 0.68 time or 32 per cent down compared to consumers who can wait for the product. Correlation type is not according to the hypothesis (negative relationship). This may be because consumers know well that pesticide free rice has a long tight process of production than other normal rice. To ensure to get safer rice, consumers are willing to wait for the product later. However, result of this factor does not have statistical significance. That may be because other variables cause more significance but are not included in the model.

Comprehension about pesticide free rice: those who know well about pesticide free rice have more chance to buy at the level of 0.15 time or increase of 15 per cent compared to those with less understanding. This may be because they know well the benefit of consuming pesticide free rice, so they decide to by this kind of rice. However, result of this factor does not have statistical significance. That may be because other variables cause more significance but are not included in the model.

9. Conclusion of the study

Consumers are willing to pay additional 12.73 baht/kg. to consume pesticide-free rice. According to Gil et al (2000)who found that Spanish consumers were willing to pay additional 12% to consume organic red meat compared to ordinary red meat.Battle et al (2006) found that consumers were willing to pay additional 100% for organic products. OrhanGunduz and ZekiBayramoglu(2011) found that consumers were willing to pay for organic chicken meat in a higher price than normal chicken meat around 6-10%. Some researches presented willingness to pay in mode of currency e.g.Liu et al (2009) found that samplings in Beijing were willing to pay additional 5.80 RMB to consume non-contaminated mooncake.

As for factor affecting decision to buy pesticide free rice of this study, it is found that education level, experience in consuming other pesticide free or other organic products, sale strategy, and promotion strategy all correlate positively with the decision according to the hypothesis which also accords to Kotler.1994 who said that factors affecting decision to buy certain products may be from personal factors and marketing factors. Research of Lockie et al (2004) found that education level is a factor affecting organic products of samplings in Australia (this is according to result of this study.) Other factors employed in this study which include household members, marketing communication, channeling strategy affect negatively toward buying decision which is not according to the hypothesis.This may be because 1) consumers think that senior members may get risk from rice with chemicals more than children comparatively, 2) traditional broadcast e.g. TV and radio still exist and are popular and easy for consumers, 3) consumers may know and understand process of pesticide free rice production which takes longer time since it need tight and good controlling, so, they can wait for the product. Nevertheless, agents should be able to inform exact time of delivering product. As for design of packaging has 2 implications: for YY case, good-looking package results in positive decision to buy, but for NY case, it results in negative way. This may be because YY consumer group may have average higher household income, so, they may think this amount of money is not much while NY group feels that packaging is not a real part of product quality but instead an additional cost of product leading to higher selling price. Therefore, they won't decide to pay more for this point.

10. Recommendations

In doing marketing plan to make consumers decide to buy pesticide free rice, there should be many means used together as following.

1.From the result of willingness to pay which shows that pesticide-free rice has potential to grow in Phayao, agriculturists, distributors and relevant parties should plan together both in production, inventory management, marketing strategy, and others in order to make as less cost as possible and higher marketing value.

2. Strategy that should be employed is that to make consumers realize benefits of pesticide free rice. This includes making consumers have experience in consuming pesticide free or other organic products. Sale strategy in part of price reduction plays an important role to persuade consumers in deciding to buy it. Private and government sectors should have consistent direction in joining together such as association of entrepreneurs with joint management that would reduce cost of public relation.

3. Government and private sectors should make more campaigns for people to consume more pesticide free rice, leading to consumers' decision to buy it and helping agriculturists and making them confident that producing this kind of rice has potential to sell definitely.

4. As for packaging, there should be 2 types. They are 1) good-looking package leading to higher selling price; and 2) normal package with not-so-high price which still keep another consumer group.

5. Agents selling product may not stock too much inventory since consumers can wait for the product but there should be an exact appointment delivery time, including other inventory management. All these would bring about lower cost in inventory.

6. In reaching consumers, agents related should not rely only on online media, they must still use traditional channels such as TV or radio because they are still popular for rural area people.

7.Marketers should reach persons who may influence decision to buy, that is, senior members of families, by showing result of effect happened to human body if receiving too much chemicals.

11. Suggestions for further research

1. There should be further study focusing on benefit occurred on agriculturists' health if they choose to grow pesticide free rice. If agriculturists can reduce their pay for illness, government budget on health can be saved.

2. There should be a study of comparison of natural degradation both in soil, water and other resources between pesticide free growing and normal rice growing. This should help bring about natural resource and environmental sustainability.

3. There should be a study on marketing patterns in other countries which have good marketing patterns on pesticide free or other organic products so that it can be adapted to suit with situation in Thailand which can result in higher market value of this kind of products, including relevant supply chain.

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