Willingness to Pay for Government-Certified Agri-Products in South Korea

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Abstract

This study investigated the value that government-issued certification labels adds to agricultural products. Using a face-to-face questionnaire administered in the Greater Seoul area, it assessed consumers' willingness to pay for government certification labels on four types of agri-products. Our results indicated that the premium for goods with these labels ranged from 7 to 32 per cent above the prices of non-certified products of the same types, while organic certificates for meat products earned higher willingness-to-pay scores than other certificate types. This clearly indicates the importance of such certification schemes to South Korean consumers.

본 연구에서는 다양한 정부인증마크가 부착된 농축산물에 대한 소비자 지불의도를 파악하고자 하였다. 이를 위해 수도권 지역 주부 소비자 306 명을 설문지를 이용한 대면면접 방식으로 조사하였다. 조사대상 농축산물은 곡류(쌀), 과일(사과), 채소(배추), 축산물(쇠고기)를 선정하고 인증마크가 없는 농축산물의 기준가격을 제시한 다음 유기농 마크와 우수농산물마크(GAP), 지리적 표시(GIS) 생산자이력추적 표시(APTMS)가 부착된 농축산물에 대한 추가지불의도(WTP)를 각각 측정하였다. 조사결과 인증마크가 부착된 농축산물에 대한 추가지불의도는 인증마크 미부착 농축산물에 비해 7~32% 높게 나타났다. 인증마크별로는 유기농 인증에 대한 지불의사가 가장 높았고 품목별로는 축산물에 대한 지불의사가 가장 높았다. 인증마크와 품목별 지불의사에 영향을 미치는 요소들도 또한 분석하였다.

Key words: certification system, Korean agri-product market, Willingness to pay, contingent valuation method (CVM)

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I. Introduction

In recent decades, South Korean consumers' food-safety concerns have been expressed frequently, despite a range of new laws, policies, and business practices intended to allay them. As well as by increased consumer expectations regarding food safety, concerns have been driven by increased international trade in food and the appearance of new food technologies such as genetic modification, irradiation for sterilization, and new additives.

Government certification systems for agri-products serve two main purposes: regulating food safety levels, and providing information to consumers. The South Korean government has designed and operated various such schemes, which are costly to farmers as well as to the government itself; but how and to what extent consumers utilize them when making purchasing decisions remains far from clear. S.-Y. Kim et al. (2012) and S. Kim (2014) studied Korean consumer preferences for agri-products and found that, although certification had been practiced for decades, the value it added to such products had not been well understood. This value is likely to be dependent upon levels of consumers' demand for information as well as their levels of confidence in the certifying authorities. Thus, when authorities promote one or the other certification systems, it is important for them to have information about added value.

Investigation of certification labeling is important for two main reasons. First, it has had an important impact on many natural-resource and food markets, by ensuring quality standards and sustainable production (Hickle, 2007). For instance, based on the prices of salmon with two eco-labels and one country-of-origin label in eight different United Kingdom retail chains, Asche, Larsen, Smith, Sogn-Grundvåg, and Young (2015) found that consumers' willingness to pay (WTP) for public goods through the supply chain could incentivize sustainable management. Secondly, a label's premium is intimately connected to consumers' concerns about quality and safety. For example, a survey by Sharma, Sneed, and Beattie (2012) found that 77 per cent of U.S. consumers were willing to pay up to 10 per cent more for food safety.

Accordingly, this study measures consumers' WTP for food safety and environmental protection, guided by the following research questions:

RQ1. What are consumers' perceptions of the value of government certificates?

RQ2. What are the determinants of consumers' WTP for government-certified agri-products?

II. Literature review

2.1. Studies for eco-labeled agri-products

Environmental certification provides consumers with information about the environmental externalities associated with production and consumption processes. Eco-labeling can ensure both sustainable production management and safe, high-quality products. For example, by using an real good experiment, Bougherara and Combris (2009) established that consumers were willing to pay premiums for attributes of an eco-labeled product other than its better taste or safety characteristics; and Latvala and Kola (2004) found that 59 per cent of Finnish consumers were willing to pay more for beef products in exchange for more information about their safety and quality.

Several studies have measured consumers' WTP for environmentally certified products, including seafood (Wessells, Johnston, & Donath, 1999), wood products (Aguilar & Cai, 2010; Aguilar & Vlosky, 2007), and wool (Peterson, Hustvedt, & Chen, 2012). All found that consumers were aware of environmental certifications and were willing to pay premiums for certified products. Ibitoye and Nawi (2014) found that Malaysian consumers' attitudes towards certified organic and non-certified rice were different, while Van Kempen, Muradian, Sandóval, and Castañeda (2009) reported that consumers' preference for firewood in rural Guatemala differed significantly according to whether it was certified.

In South Korea, according to NAQS website, the responsibilities of NAQS include agri-food safety investigations, the promotion of eco-friendly products, the management of GAP certification, the management of genetically modified organism (GMO) and origin-based labeling, inspection of agricultural commodities, and the registration of agricultural businesses. NAQS's prevailing agricultural-product certification systems include the Environmentally Friendly Agricultural Product Certification (EFAPC), also known as the Organic Processed Food Certification System; the Good Agricultural Practices (GAP) Certification; the Agricultural Products Traceability Management System (APTMS); the

Korea Protected Geographical Indication (KPGI), also known as Geographical Identification System; and the Management of Processed Agri-Food Certification (MPAC).

The purposes of and areas covered by these systems vary widely. For instance, EFAPC emphasizes whether production processes meet standards of environmental friendliness, whereas GAP and APTMS focus on safety management for agricultural food from the production stage to the retail stage, and KPGI aims to improve the quality of regional specialties and foster geographically specific agricultural products and industries. Each provides consumers with abundant purchasing information, and collectively, they represent a reliable, government-backed, nationwide standard for agri-food safety and quality that bears comparison to the best such systems in the world. This study summarizes the main attributes of each system in Table 1. Based on the inspection process in the production process, product quality examination and origin traceability, this study categorizes certifications into three types: no regulated, weakly regulated and strongly regulated. When a certification has strict examination or regulation, a solid mark is given in the section. On the other hand, a empty mark and no mark are given when a certification regulates with exemptions in some conditions and no regulation respectively.

Table 1. The NAQS certification labels

Attribute	Production process				Product quality examination			Origin traceability		
Certification	Pesticide safe use	Pesticide free	Risk management	Environmental friendly	Safe pesticide residue	Pesticide residue free	Process safety management	Producer	Location	Recording history details
Organic Certification	●	●		●	●	●	●	●	○	
GAP	●		●	○	●		●	●	●	
APTMS			●				●	●	●	●
GIS, KPGI			○	○			○	●	●	○

●: Strongly regulated ○: Weakly regulated [Strongly/Weakly regulated are defined by this study based on the certification regulations]

2.2. WTP for eco-labeled agri-products in Korea

Nevertheless, little research has examined consumers' WTP for certified agri-products in South Korea. The few such studies that have been conducted have all estimated WTP based on surveys with open-ended questions or dichotomous choices with follow-ups. All have found that most Korean consumers preferred certified products and were willing to pay more for them, but that their WTP varied by product and consumer characteristics. Han and Kim (2014) measured 750 students' WTP in a university cafeteria, and found that most of them preferred environmentally friendly chicken over safety-certified chicken. If the price for a typical meal was held constant at 3,000 won, the extra WTP for safe food (Hazard analysis and critical control points, HACCP) was 1,304 won, and for eco-friendly food, 1,329 won. Determinants of WTP included price perception, taste perception, preference, and frequency of eating out, but knowledge about the certificates was critical: the more the respondents knew about the certificates, the more they were willing to pay for certified products.

H.-Y. Oh and Heo (2005) investigated 143 mothers' WTP for eco-friendly meal service in four childcare centers in the same city. The average additional value was 1,600 won for meals in a month, and the WTP for eco-friendly meals was 8,360 won per month. Most of the mothers perceived eco-friendly agri-products as being good for their children, and wanted to adopt them in preference to general agri-products. However, such feelings were stronger regarding grain and vegetables than meat and fruit. Other factors influencing WTP included price elasticity of demand, meal-service satisfaction, and the respondents' characteristics such as age, education level, income, and number of children.

Based on a survey of 247 housewives in Seoul, Heo, Kim, and Lee (2011) estimated the average household WTP for environment-friendly agriculture as 16,385 won per month. If this held for all households in the city, it would represent 658.3 billion won per year. The same study found that WTP was significantly and positively correlated to environment-friendly consumption behaviors, household consumption expenditure, and household income, and significantly and negatively correlated to age.

In contrast to the studies discussed above, all of which used open-ended questions, H. Oh and Lee (2001) estimated WTP using a contingent-valuation method with dichotomous choices and follow-up interviews. They interviewed 240 housewives and asked how much they would be willing to pay for environmentally friendly farm products, after explaining the

costs and benefits of environmentally friendly agriculture. The authors found that the respondents were willing to pay 54.8% more for environmentally friendly rice and 63.2% more for environmentally friendly vegetables. Age, income, education, number of children, home town, and eco-education experience all were correlated with WTP, with high-income and well-educated respondents in their 30s and 40s most willing to pay more.

2.3. WTP measurement

Various methods of assessing consumers' WTP for agri-products have been proposed (for reviews, see Breidert, Hahsler, and Reutterer (2006) and Tully and Winer (2014)). Following Breidert et al. (2006), on the highest level, methods can be classified into revealed preference and stated preference. Techniques for revealed preference, including market observation and experiments, measure consumers' WTP by observing their purchase behavior and intention. Instead of asking respondents' perceptions, this type of measurements find respondent's WTP through observing and analyzing their actual or simulated price-response behavior. The main advantage is that market data in real purchases and a mimic environment built by experimental designs would reveal their true intention. The limitations include the limited information to reveal respondents' perceptions on other product attributes, higher cost of data collection, and the constraint of estimating WTP for non-market items where no price exists and entirely new products where little common information is available to respondents. Recent applications are provided by Arnot, Boxall, and Cash (2006) and Allen and Rehbeck (2016).

On the other hand, techniques for stated preference measure consumers' WTP by employing surveying techniques. WTP could be derived indirectly by asking respondents to rate or rank for different products. Conjoint analysis and discrete choice analysis are two major methods. Alternatively, WTP could be directly derived by asking selected respondents (consumers or experts) about how much they would be willing to pay for products. Instead of being extracted from the observation data, the advantage of stated preference approach is that respondents' preferences are clearly stated by themselves. In addition, this approach could find more attributes for the needs of research purposes. Besides, even if face-to-face interview costs more time and budget than telephone, postal and online survey, stated preference approach is usually more time efficient and cost effective to revealed preference

approach. Recent applications are provided in the field of non-market environmental goods (such as Börger et al. (2017)) and medical and health care (such as Bridges (2003)).

However, stated preference approach has several challenges. The first challenge is the validity of estimations. Respondents do not necessarily state their true WTP in direct surveys. They might overstate prices because of prestige effects or understate prices because of consumer collaboration effects (Breidert et al., 2006). The second and the most crucial challenge is that, even if respondents state their true valuation of a good, the valuation does not necessarily reflect to real purchasing behavior (Nessim & Dodge, 1995).

Table 2 summarizes 14 recent WTP studies' methodologies, target products, and results. Revealed preference approach is less popular than stated preference approach. The more innovative methods have included real-choice experiment that measured WTP for the environmental attributes of non-food agricultural products (Michaud, Llerena, & Joly, 2012); sealed-bid, second-price auction to measure Japanese consumers' WTP for Marine Stewardship Council (MSC) eco-labeled seafood (Uchida, Roheim, Wakamatsu, & Anderson, 2014); and four-country investigation of WTP for red-meat traceability (Dickinson & Von Bailey, 2005). Each method has its advantages and shortcomings. Due to the constraints of budget and time, the flexibility to measure consumers' attributes and potential product combinations, stated preference approach is therefore the mainstream approach. The main advantage of surveying consumers directly provides a high degree of control regarding the respondents' knowledge, beliefs, preferences and WTP with specific reference to various agri-products and certificates.

Table 2. Recent WTP studies' methods, target products, sample sizes, countries studied, and results

Study	Method	Target products	Sample size, Country	WTP
Bougherara and Combris (2009)	Choice-experiment auction	Orange juice	128, France	28-29.5 per cent higher than conventional products
Sharma et al. (2012)	Online contingent valuation method (CVM)	Restaurant food	309, U.S.	56 per cent of consumers were willing to pay up to 10 per cent extra for food safety
Latvala and Kola (2004)	Online CVM	Beef	1640, Finland	59 per cent of consumers were willing to pay more to obtain information about safety and quality of beef products
Wessells et al. (1999)	Phone CVM	Seafood	1640, U.S.	A wide range of conditions influenced consumer acceptance of a labeling program
Aguilar and Vlosky (2007)	Phone CVM	Wood products	439, U.S.	Consumers were willing to pay a 10 per cent premium for three of the four certified items
Peterson et al. (2012)	Online CVM	Wool	514, U.S.	Most consumers valued organic certification less than combined environmental-sustainability and animal-welfare information
Aguilar and Cai (2010)	Online choice-based conjoint survey	Wood products	1142, U.S.; 1160, U.K.	Consumers in both countries preferred eco-labeled products between 3.9 times and 15.6 times more than products without such labels
Van Kempen et al. (2009)	Field experiment	Firewood	218, Guatemala	More for legal firewood
Uchida et al. (2014)	Lab experiment	Seafood	160, Japan	20 per cent more for eco-labeled seafood products
Dickinson and Von Bailey (2005)	Lab experiment	Red meat	108, U.S.; 54, U.K.; 108, Canada; 54, Japan	7-25 per cent more for traceability-labeled meat
Han and Kim (2014)	Survey	Chicken	750, Korea	43 and 44 per cent more for HACCP and eco-friendly food, respectively
H.-Y. Oh and Heo (2005)	Survey	Childcare center meals	143, Korea	422 per cent more for eco-food
Heo et al. (2011)	Survey	Agri-products	247, Korea	16 385 won more per month per household for eco-products
H. Oh and Lee (2001)	CVM	Agri-products	240, Korea	54.8 per cent more for rice, 63.2 per cent more for vegetables

III. Research methods

3.1. Research model and hypotheses

Based on the foregoing review of the relevant literature, it is reasonable to expect that consumers will be willing to pay extra for the combination of specific information and sense of trustworthiness that certification systems convey. Our examination of South Korean consumers' WTP for agri-products focuses on three major factors: consumers' beliefs about product quality; their perceptions of the importance of food safety, eco-friendliness, and place of origin; and their knowledge about certificates. Additionally, in the case of government-certified products, we assessed their trust in government. Figure 1 presents the hypothesized relationship between these four factors and WTP for certified products.

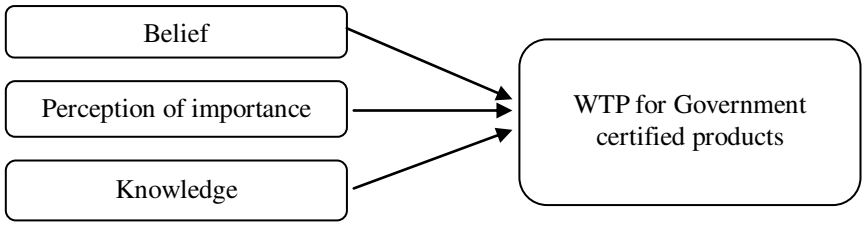

Figure 1. Factors affect the willingness-to-pay for certified and government certified products.

Regarding consumers' beliefs, we propose two hypotheses. First, the influences of food safety could be limited in an individual level. However, environmental friendliness has a broader influence to a public level. Considering their impacts to the society, we make the first hypothesis.

H1: The respondents' WTP for food safety will be lower than their WTP for environmental friendliness.

The second hypothesis is about the food type. Compared to non-staple food (beef, cabbage, apple), staple food is essential to daily meal. It would be intuitive for more concerns about staple food. Hence, we make the second hypothesis.

H2: The respondents will be willing to pay a lower percentage premium on the prices of non-staple food than on staple food (rice).

Turning now to the second factor – the respondents' perceptions of the importance of food safety, eco-friendliness, and place of origin – we propose the following three hypotheses based on the assumption that respondents' backgrounds could drive their perceptions of these issues.

H3. Respondents' household income will be positively correlated with their WTP for safe and environmentally friendly food.

H4. Respondents' household expenditure will be positively correlated with their WTP for safe and environmentally friendly food.

The final factor, consumers' knowledge/understanding of four types of certificates, is the subject of two hypotheses, built based on the assumption that eco-labeling provides positive added value to products, and that respondents will therefore pay more for labeled products if they know about and understand the certification system. We acknowledge the subjective self-evaluation might be biased. However, our aim of ranking consumers' knowledge would not be different with such design.

H5: Respondents' understanding of eco-labels' information will be positively correlated with their WTP.

3.2. Survey design

To achieve high quality samples and accurately identify members of the target population, the present study made use of a face-to-face questionnaire that included open-ended and discrete-choice questions. Among face-to-face, telephone, postal and online surveys, the last-named has become the major tool for data collection due to time and budget constraints. However, prior research has found that respondents who completed web-based surveys were more prone than others to generating low-quality data, probably due to the ease with which such surveys can be completed very rapidly (Malhotra, 2008). The alternative method, travel-cost method, hedonic price method, and contingent valuation method are all used mostly to evaluate non-market goods, whereas we aimed to evaluate agri-products in the market and find out consumers' preferences directly. Among its several advantages, our chosen methodology allowed us to vary several attributes of a product and to estimate the marginal rates of substitution between these attributes. It provides great flexibility, in the sense that many different scenarios can be presented in a single study. Moreover, in contrast to costly real-goods experimental methods, ours can easily observe consumers' preferences through adjustments of product types and certification labels.

The survey was administered to 306 females aged between 21 and 61 in the Greater Seoul area in 2016. The questionnaire script was in the Korean language. We instructed our interviewers to randomly select potential respondents at local markets and community centers, but interview only those who were the decision-makers on household grocery

purchasing. All participants were provided with explanations of the questions that were as detailed as they could be without biasing the results. Our questionnaire design utilized discrete-response items to collect data on consumers' attributes (allowing such attributes to be normalized and compared across all respondents), and open-ended questions to measure their WTP as precisely as possible.

In terms of their beliefs regarding the quality of certified agri-products, the respondents were asked if the certified products were safe, environmentally friendly, and good quality on a five-point scale, with 1 being 'strongly disagree' and 5 being 'strong agree'. Two additional variables, included to represent consumers' subjective perceptions, were whether the South Korean food market is safe, and whether the South Korean government's food policy is trustworthy. Both these items were measured according to respondents' perception on products in Korea. The respondents' self-reported knowledge of each of four government certificates was measured using five-point scales ranging from 1 ('don't know well') to 5 ('know very well').

The respondents were then asked to rate the importance of nine attributes in their decisions to purchase agri-products, using a 10-point scale ranging from 1 ('not important at all') to 10 ('most important'). These attributes were: brand, production location, eco-friendliness, price, Korean products, appearance, nutrition, safety, and freshness.

Lastly, the instrument measured WTP using the case of four agri-products: rice, cabbage, apples, and beef, which were selected as being the agri-products most commonly used by Korean households. We acknowledge no certified organic beef was available in South Korea at the time the study was conducted, and that our questions about it were hypothetical. After being given the baseline price for uncertified products, respondents were asked their WTP for products with four different types of NAQS certificates (Organic, GAP, KPGI, APTMS). To avoid biased information and increase the precision of the responses, all our questions about WTP were open-ended.

IV. Results

4.1. Subjects' backgrounds

A summary of the 306 respondents' characteristics is provided in Table 3. We acknowledge the sample size is not large. However, this number is sufficient to achieve the research objective. All were female, all were decision-makers regarding household purchases, and all

lived in the Greater Seoul area. They ranged from 21 to 61 years old, with a median age of 48. The mean number of children in their households was 1.7.

Table 3. Characteristics of the Subject Sample

Variables	Mean	Number of Respondents
Age	45.4	305
Number of Children	1.7	304
Household income (unit: 10,000 won)	525.1	306
Expenditure on Food (unit: 10,000 won)	69.2	306

In terms of their shopping behavior, the respondents mostly purchased food at hypermarkets (48.3 per cent), and small- and medium-sized supermarkets (28.8 per cent). Only 9.5 per cent of households mostly sourced their food from traditional markets, and 6.9 per cent from eco-specialty stores. Despite the apparent popularity of online shopping, a mere 0.7 per cent of the respondents' households bought food primarily using the internet – even fewer than bought it from department stores (4 per cent) or directly from farmers (1.3 per cent).

In terms of their education level, nearly two-fifths of the respondents reported holding a four-year college degree, and an additional 17 per cent a two-year college degree. Just 3 per cent of the participants had not finished high school. Nearly half (48.5 per cent) had a full-time job, whilst 18.7 per cent had a part-time job and 32.8 per cent were full-time housewives. Their average household income was 5.25 million won and average monthly expenditure on food was 0.69 million won. Both these figures were higher in absolute terms than the 2016 South Korean averages of 4.43 million and 0.33 million won (provided by Statistics Korea 2017), and our respondents' food expenditure was, as a proportion of their incomes, nearly double the national average. This was probably due to our survey location in the capital region.

4.2. Consumers' beliefs, knowledge, and importance perceptions

When asked if the certified agri-products were good for health, beneficial to the environment, and high quality, the respondents rated them positively: 3.75, 3.8, and 3.82 out of 5, respectively. The differences between these average responses were not statistically significant.

Regarding importance perceptions, freshness was rated the most important attribute in product purchasing (mean score: 9.08 out of 10), and this was significantly higher than the

other eight attributes. Food safety took second place (8.57), but this score was not significantly different from those of nutrition (8.41), appearance (8.25) and South Korean origin (8.24). Compared to the above-mentioned attributes, price (8.05) was considerably less important, but nevertheless more important than eco-friendliness (7.23) and regional origin (7.07). It is worth noting that respondents concerned food safety more than eco-friendliness. This could support the hypothesis H1.

Regarding their knowledge of the four studied certificates, the respondents were not confident in their understanding of government certification systems. However, their levels of understanding differed significantly across each certification type. The respondents' knowledge of the organic certificate (3.19 out of 5) was significantly higher than their knowledge of GAP (2.84), KPGI (2.32), or product-tracking certificates (2.58). The popularity of organic mark may due to the government promotion and education in the past decades. Other certifications have not been well introduced and understood by consumers.

Regarding trust in government-certified agri-products, our respondents reported moderate levels of confidence in food safety (average 3.03 out of 5). When asked to give two reasons for not buying government-certified products, 26.8 per cent answered that they did not trust the government.

4.3. Willingness to pay scores

As shown in Table 4, the respondents' WTP was highest for beef, followed by cabbage, apples, and rice. The WTP for apples and cabbage were insignificantly different from each other in most cases. This result is against our hypothesis H2 which assumes consumers would willing to pay more for the staple food.

Table 4. Estimations of Willingness-to-pay for certified agri-products

Non-certificated Products	Organic	GAP	GIS	APTMS	average.
Rice	57,264	55,336	53,500	53,704	
(50000won, 100%)	115.5%	110.7%	107.0%	107.4%	109.8%
Cabbage	3,792	3,512	3,376	3,394	
(3,000won, 100%)	126.4%	117.1%	112.5%	113.1%	117.5%
Apple	36,915	34,516	33,263	33,284	
(30,000won, 100%)	123.1%	115.1%	110.9%	110.9%	114.9%
Beef	26,431	24,588	23,653	23,692	
(20,000won, 100%)	132.2%	122.9%	118.3%	118.5%	122.6%
average	124.4%	116.4%	112.2%	112.5%	116.1%

One-way between-subjects analysis of variance (ANOVA) was conducted to compare the effects of product sources on WTP for products: 1) with safety labels; 2) with environmental-friendliness labels. There was a significant difference between product sources at the 1 per cent level. Post-hoc comparisons using the Tukey HSD test indicated that WTP for products with environmental-protection labels was higher than WTP for safety labels, but this difference was not statistically significant. In other words, the first hypothesis H1 was rejected by the result.

Following we discuss the factors to make the difference between WTP for food safety and eco-friendliness. Table 5 reports our estimates, using ordinary least squares (OLS), of the changes in consumers' WTP for food safety and eco-friendliness. The dependent variable was percentage change compared with the baseline price, and the independent variables were consumers' background information, beliefs, knowledge, and preferences.

In terms of background information, higher household grocery expenditure was correlated with higher WTP for products with safety marks and eco-friendliness labels. In other words, the previous hypothesis H3 was not supported but H4 was significantly supported in both WTP for food safety and eco-friendliness.

Regarding beliefs, the results suggest that when a consumer's perception of food safety in South Korea was low, she would pay more for products with safety and eco-friendliness labels. A consumer's positive attitude toward eco-friendliness and quality labels also positively affected her WTP for such labels. Surprisingly, however, there was no significant relation between perceptions of safety marks and WTP.

Our analysis adopted a dummy variable, *No trust in government*, with a value of 1 for those respondents who mentioned trust in government as one of their two major reasons for not purchasing products with government-certification labels, and 0 for other respondents. Our results indicate that respondents with low trust in government would pay less of a premium than other respondents for products with safety and eco-friendliness labels. Conversely, the more a consumer agreed that government certificates accurately reflected eco-friendliness and high quality, the more they were willing to pay for products with the relevant marks.

Turning to the respondents' importance perceptions, our results indicate that those who were more concerned about eco-friendliness had higher WTP for safety marks as well as for eco-friendliness ones. The consumers who were most concerned about nutrition also had high WTP for products with eco-friendliness marks, but lower WTP for products with safety marks. Interestingly, the respondents as a group reported significantly lower WTP for eco-

friendliness in the case of products they perceived as originating in South Korea. Nevertheless, those respondents who were most concerned about products' national origin were willing to pay more for products with safety and eco-friendliness labels. Also, those most concerned about brand were willing to pay more for products with safety labels.

In terms of the respondents' knowledge about government certification, our findings indicate that those who claimed high levels of understanding of GAP marks were willing to pay more for eco-friendliness labels. However, those who claimed high levels of understanding of the KPGI mark were less willing than their highly GAP-knowledgeable counterparts to pay more for eco-friendliness labels. The hypothesis H5 was supported by the association between GAP and GIS understanding and WTP for eco-friendliness.

Table 5. Estimations of Willingness-to-pay for product sources

Dependent variable / Variables		WTP for safety	WTP for eco-friendliness
Constant term		.06	.03
Belief	Perception of food safety in Korea	-.03***	-.02***
	No Government Trust	-.05***	-.04***
	Perception of safe mark	.002	-.003
	Perception of eco-friendly mark	.001	.02**
	Perception of good quality mark	.02***	.02**
Perception of importance	Importance: Korean product	-.003	-.01***
	Importance: Product origin	.01***	.01**
	Importance: Safety	-.001	.003
	Importance: Freshness	-.001	-.001
	Importance: Price	-.004	-.003
	Importance: Brand	.01***	.001
	Importance: Eco-friendly	.01***	.01**
	Importance: Appearance	.01	-.002
	Importance: Nutrition	-.01**	.01***
Knowledge	Knowledge on organic mark	-.004	-.01
	Knowledge on GAP mark	.01	.02**
	Knowledge on GIS mark	-.01	-.01**
	Knowledge on APTMS mark	-.002	-.01
Product type	Dummy cabbage	.04***	.06***
	Dummy Apple	.01	.02**
	Dummy Beef	.07***	.08***
Background	Age	-.001	-.001
	Number of child	.001	-.01
	Household income	2.3E-5	9.4E-6
	Grocery expenses	.000***	.000**
	R Square Change	0.16	0.13
	Observation	1210	1201
	Durbin-Watson	1.63	1.93

Note: Each cell contains coefficient. **, *** mean significant at 5%, and 1% respectively.

A one-way between-subjects ANOVA was conducted to compare the effects of product sources on WTP for products with organic, GAP, GIS and APTMS certifications. These certifications differed at the 1 per cent significance level. Post-hoc comparisons using the Tukey HSD test indicated that the WTP for products with organic certificates were significantly higher than for others: up to 26 per cent more than the baseline price. Those with GAP marks could be sold for 10 to 15 per cent over baseline prices. Taken together, these results suggest that different government certificates have differential effects on consumers' WTP. Specifically, consumers were willing to pay the highest price premiums for products with organic certificates, and the lowest premiums for those with GIS certificates.

The respondents did not treat all four product types equally. Their WTP for beef was significantly higher than for the other three products, with organic-marked beef commanding a 24 per cent premium over the baseline price. Rice scored the lowest WTP, whilst the WTP for cabbage and apples were did not differ significantly from each other.

Table 6 presents OLS estimates of the respondents' WTP for government-certified labels. Here, the independent variables are consumers' background information, beliefs, knowledge, and preferences. In terms of background, the findings suggested that older people were willing to pay more of a premium for APTMS certification, but less of a premium for organic marks. Higher household incomes were positively and significantly correlated with WTP for GAP, GIS and APTMS certificated products, while number of children was significantly and positively correlated with WTP for organic-marked products.

In terms of consumers' beliefs, our results indicate that the more one perceives food in South Korea as unsafe, the higher one's WTP for products with organic, GAP and GIS marks. Surprisingly, however, WTP for organic products was higher among people who agreed that government-certified labels guarantee good quality than among people who disagreed. Likewise, WTP for products with GIS and APTMS marks were higher among respondents who agreed that these labels guaranteed eco-friendliness. Notably, the hypothesis that higher WTP for government-certified products was associated with consumers' perceptions of safety was supported only by weak evidence.

Regarding the respondents' importance perceptions, our results indicate that WTP for organic-, GAP- and GIS-marked products were higher among those consumers who were more concerned about eco-friendliness. Among those who were more concerned about price, WTP for organic, GIS and APTMS marks were lower. The impact of brand was more mixed:

among those consumers most concerned about it, WTP for organic products was lower than the mean value, whereas WTP for GIS and APTMS products was higher. Thus, it is worth wondering whether brand and certifications are substitutable.

Our findings about the respondents' knowledge of government certification suggests that those who claimed a better understanding of GAP marks would be willing to pay more for products with organic labels, as well as for GAP ones. However, there was no significant evidence to support an association between the respondents' levels of understanding and any other certification marks. In other words, the hypothesis H5 was supported only by the association between GAP understanding and WTP for organic and GAP certifications.

Finally, our results suggest that those consumers who did not trust in government were not willing to pay as much for products with organic and GAP marks as those who did trust in it. This may be due to organic and GAP marks being the most familiar certifications among Korean consumers.

Table 6. Estimates of WTP for Government Certified Labels

Dependent variable / Variables		WTP for organic	WTP for GAP	WTP for GIS	WTP for APTMS
Constant term		-.05	.01	-.03	-.08
Belief	*Perception of food safety in Korea*	-.03***	-.02***	-.01**	-.01
	No Government Trust	-.05***	-.02**	-.02	-.001
	Perception of safe mark	.01	.01	-.001	.01
	Perception of eco-friendly mark	.01	.01	.02**	.02**
	Perception of good quality mark	.03***	.010	-.004	.002
Perception of importance	*Importance: Korean product*	.01***	-.01	-.01	-.01
	Importance: Product origin	.001	.01**	.01	.001
	Importance: Safety	-.001	.004	-.004	.003
	Importance: Freshness	-.001	-.01**	-.003	-.01**
	Importance: Price	-.01**	-.01	-.01**	-.01**
	Importance: Brand	-.01**	.002	.01**	.01**
	Importance: Eco-friendly	.01**	.01**	.01**	.004
	Importance: Appearance	.003	.002	.00	.004
	Importance: Nutrition	.003	.002	.01**	.01**
Knowledge	*Knowledge on organic mark*	.01	-.001	.004	-.003
	Knowledge on GAP mark	.02**	.02***	.01	.002
	Knowledge on GIS mark	.004	-.01	-.002	.00
	Knowledge on APTMS mark	-.01	-.01	-.01	-.01
Product type	*Dummy cabbage*	.09***	.05***	.04***	.04***
	Dummy Apple	.06***	.04***	.03***	.03**
	Dummy Beef	.12***	.09***	.08***	.08***
Background	*Age*	-.002**	.00	.001	.001**
	Number of child	.02**	.01	.002	.003
	Household income	3.2E-6	3.4E-5**	2.8E-5**	4.1E-5***
	Grocery expenses	.00	.00	9.4E-5	5.6E-5
R Square Change		0.189	0.122	0.111	0.100

Observation	1212	1212	1216	1216
Durbin-Watson	1.694	1.815	1.958	1.982
Note: Each cell contains coefficient. **, *** mean significant at 5%, and 1% respectively.				

V. Conclusion

Amid rising concerns about both food safety and environmental friendliness, various government certification systems have been implemented. The present study has focused on the statistical associations between South Korean consumers' preferences and their WTP for certified agri-products. The results show that such WTP ranged from 110 per cent of the baseline price (for rice) to 123 per cent (for beef); and that the average WTP across all the product and certificate types we studied was 116 per cent of the baseline prices. Among the four certificate types and four product types, WTP for organic certificates and for beef were highest respectively. The strengths of the respondents' beliefs and the levels of their knowledge of government certificates were both very low, and neither had much of an effect on WTP. In general, the perception of food safety in Korea, no trust in government, concerns on price and brands may have contributed to the decrease in the WTP for certified products. On the other hand, the higher WTP may have been caused by an increase in perception of eco-friendly and good quality marks, concerns on eco-friendliness.

This study has several limitations which could be addressed by the future studies. First, the sampling of this study was limited to housewives in one urban area. A further investigation could expend the sampling size and scope. Second, though our method could clearly rank consumers' preference toward various certification and product types, a common criticism is that the CVM survey result may overestimate consumers' WTP. WTP only indicates the payment intention and may be quite different from real purchasing behavior. In order to capture more precise WTP, real good experiment might be an adequate method for further studies.

Taken as a whole, this study attempts to provide policy implication based on our results. We suggest that government certification systems should be examined collectively, in terms of both efficiency and trustworthiness. For example, our findings imply that the primary focus of organic programs should be extended to meat products rather than rice, vegetables, and fruits. We also urge a government program to increase efficiency and enhance value in certified agri-products: while our respondents' premium for eco-friendly products was 10 to 26 per cent, a report of Korea Rural Economic Institute (KREI) indicated that the average

premium for eco-friendly products was 40~70 per cent in the real market transaction (Sung, Lee, & Chung, 2017). The high premium of certified products was suggested due to the extra cost of certifying process, and low efficient certification system. Besides, our results indicate that premiums for certificates are significantly different: consumers would pay more for familiar certification systems. This implies that the government should exert more efforts in enhancing public knowledge of government certification systems, such as GIS and APTMS.

In addition, trust in government and producers shall be concerned. Specifically distrust of government issued certifications is found to be the one of major barriers to enhance premium for the eco-labeled products. Consumers' perception of labeled products is far from their desirable standards. This study indicates that incapable quality management of eco-friendly products leads to the issue of distrusted government certificates. As Giraud (2002) mentioned the European Community's eco-labeling system, the system has been developed to help consumers by giving them information about the products' specific characteristics. In order to build consumers' confidence, it is necessary to provide sufficient information about the rules and standards of eco-label certificates. The eco-labeling market in Korea has potential. Whilst a further detailed investigation is required, transparent management process and enhanced educational campaigns would be necessary to increase trust in government-certificated agri-products in Korea.

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