

Research paper

## Study on Consumer Recognition of, Satisfaction with, and Repurchase Willingness for Forest Products Certified by the CAS Certification System

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### [ Summary ]

The logo of Certified Agriculture Standards (CAS) represents the certification for premium Taiwanese domestic agricultural product. Since 2005, the CAS certification system has involved the certification of forest products, which mainly include bamboo charcoal, bamboo vinegar, and related products. This study used a questionnaire to analyze the domestic consumer recognition of, customer satisfaction with, and customer willingness to repurchase CAS-certified forest products. The major purpose of this study was to offer results as references for strategies to promote marketing by the manufacturers of bamboo charcoal and bamboo vinegar, and the CAS Development Association in the future. The main results showed that the consumer recognition of CAS labels reached 82.9%, although only 42.6% of consumers knew that forest products were involved in the CAS certification system, only 28.1% of consumers had purchased CAS-certificated forest products, and only 1/3 of total consumers had purchased bamboo charcoal-related products (including non-certified products). Obviously, past activities to promote these products were insufficient. Hence, to promote the benefits for both producers and consumers through implementation of an excellence certification system, activities to popularize the CAS certification system related to forest products must be strengthened in scope and depth. Additionally, the results of  $\chi^2$ -test of demographic characteristics showed that there was a significant difference in ages of people who recognized the CAS label. A higher proportion of the elderly group over 60 yr of age was familiar with the CAS label than other age groups. Therefore, the elderly group with a high interest in certified products should not be ignored when activities to popularize the CAS certification system are carried out in the future.

**Key words:** forest products, bamboo charcoal, customer satisfaction, CAS certification label.

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## 研究報告

## 國內消費者對CAS驗證林產品之認知、使用滿意度 及再購買意願之研究

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### 摘要

台灣優良農產品標章CAS自2005年納入林產品驗證項目，其所驗證之林產品類別目前以竹炭、竹醋液及其相關產品為主要範圍，本研究透過問卷調查方式，分析國內消費者對CAS發展協會所驗證之竹炭與竹醋液相關產品之認知程度、使用滿意度及再購買意願，主要目的在提供分析結果作為竹炭與竹醋液生產廠商及CAS發展協會未來在推廣CAS林產品時擬訂行銷策略參酌之用。本研究主要分析結果顯示，國內消費者認識CAS驗證標章者比例雖高達82.9%，然知道有林產品類者僅佔42.6%，且曾購買CAS驗證林產品僅28.1%，其比例僅及全數有購買竹炭產品經驗者之1/3，由此可見其推廣成效仍有不足之處。因此，如何讓消費者知道在CAS驗證標章項目中已列入林產品驗證類之推廣工作在廣度與深度上有待擴大加強，方可提昇此良善驗證標章制度對廠商與消費者雙方利益。而透過交叉分析卡方檢定，填答者之社經特質中年齡對CAS標章認知程度呈現顯著差異，大於60歲之長者對CAS標章認知程度高於其他年齡層。因此，未來CAS標章在推廣時，不可忽視對驗證產品有較多興趣的長者族群。

關鍵詞：林產品、竹炭、消費者滿意度、CAS驗證標章。

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## INTRODUCTION

Certification is a written assurance issued by an independent third party to demonstrate that products or services produced under certain procedures comply with clearly defined standards and reach a certain quality level. (Wang 2007, Bhat 2009). In general, producers and consumers are not in a direct contact. Therefore, the major objectives of certification are to protect consumer safety and provide a guarantee to consumers of their benefits and rights. Numerous certification systems are widely used in various fields such as for quality management of products, food hygiene, and environmental management (Hwang 2004, Becker 2009, Chang 2009, FSC 2011).

The logo of the Certified Agricultural Standards (CAS) is a semiofficial certification system for assessing Taiwanese agricultural products. The system is supported by the highest agricultural authority of Taiwan, the Council of Agriculture, and is executed by the Juridical Person of the Taiwan Premium Agricultural Products Development Institute. Its major missions are to endeavor to upgrade the quality, hygiene, and safety of domestic agricultural output and their processed products, and ensure the dietary hygiene and safety of consumers (CAS 2010). Certification can increase the value of agricultural products and farmers' revenue, and simultaneously promote the quality of the diet of citizens. Ad-

ditionally, this system guarantees the mutual interests of producers and consumers, and also make it possible to differentiate domestic products from imported ones.

The CAS certification has been implemented for over 20 years in Taiwan. In the early stage, the main certified items were processed meat products and frozen foods, and these are most trusted by consumers due to long-term effective execution. CAS-certified categories were gradually extended based on rising demands to promote the quality of agricultural products. By early 2010, there were 14 major categories including meat, frozen foods, fruit and vegetable juice, quality rice, preserved fruits and vegetables, ready-to-serve meals, refrigerated foods, fresh edible mushrooms, fermented foods, snack foods, egg products, minimally processed fruits and vegetables, and aquaculture and forestry products. To the present, there are some studies which investigated consumer recognition of CAS categories; for instance, Chou (1999) analyzed market choices and consumption behaviors of urban households for CAS pork products in Taiwan; Sun (2005) investigated consumer preferences for CAS Taiwan premium rice and its promotion strategies; Lin (2005) analyzed the economic efficiency of the CAS and HACCP certification labels for food safety; Lin (2007) analyzed consumer perceptions and behaviors of households in the greater Taipei region toward CAS-certified fisheries products; Chang (2009) published a case study of the hog industry to analyze its business effects on the performance by CAS certification; and Hwang (2004) surveyed owners' willingness and behaviors in the Taiwan forest products industry toward ISO 14001 and ISO 9000 certification.

The category of forest products was brought into the CAS certification system in 2005 for the purposes of upgrading the quality

of production and products, adding value to products, strengthening producers' competitiveness, and assuring consumption benefits for consumers. The current major certified items are products related to bamboo charcoal and bamboo vinegar. The reason why products related to bamboo charcoal could be promptly developed and produced in the past few years in Taiwan was the successful results of the agricultural authorities actively carrying out a project called "Transforming and Revivifying Plan of the Bamboo Industry", which aimed to increase the utilization of bamboo resources, raise effects of bamboo forest management, and promote the integrated production and competitiveness of the bamboo industry (Hwang 2002). Because high-temperature carbonized bamboo charcoal possesses powerful absorption/attachment capabilities due to its dense structure with enormous micro-pores, bamboo charcoal offers multiple functions in numerous fields; for instance, regulating humidity, deodorizing, purifying water, improving soils, and promoting food tastes. Additionally, bamboo vinegar is a byproduct of the production of bamboo charcoal (Huang 2002). Owing to these potential benefits, the bamboo charcoal industry has gradually attracted investments in production. Wang (2007) applied involvement theory to survey the willingness of bamboo charcoal manufacturers in Taiwan to take part in the CAS certification system and simultaneously analyzed the factors affecting that decision. Regretfully, the study did not investigate consumer recognition of or consumer behavior toward CAS-certified forest products. Li (2004) used the theory of the consumption values and market choice behavior to analyze the key factors influencing the purchase behaviors of consumers for products of bamboo charcoal. At that time, products related to bamboo charcoal and bamboo vinegar were regarded as new products on the market,

and there was no CAS certification system for them. In Li's study, related connections of consumer recognition and the acceptability of CAS-certified forest products were not discussed. Certified forest products authorized by the CAS label have been in existence for over 5 yr, yet there is still no related study analyzing domestic consumer recognition of these products. Therefore, besides analyzing consumer recognition, this study simultaneously investigated issues related to consumer satisfaction with and willingness to repurchase certified bamboo charcoal products through a questionnaire which collected related information on consumption experiences. The purposes of this study were to contribute the results as important references toward marketing strategies for manufacturers of bamboo charcoal and bamboo vinegar and for extension activities in the future for the Taiwan Premium Agricultural Products Development Institute.

## MATERIALS AND METHODS

### Questionnaire design

All related variables of consumer behaviors in this study were obtained using a structured questionnaire. The questionnaire consisted of 4 parts: the first part inquired about consumers' recognition of the CAS logo, CAS-certified categories, and certified forest products; the second part inquired about consumers' purchase experiences with products related to bamboo charcoal; the third part inquired about consumers' satisfaction after they had used bamboo charcoal products and their repurchase willingness; and the last part collected personal demographic characteristics of the respondents.

### Sampling and data collection

Because most bamboo charcoal's multiple purposes contribute to our daily family

livelihood and does not just serve a single person, the sampling unit of this study was based on households in Taiwan. Sampling data were derived from the national household database of the Ministry of Interior 2010. According to stratified random sampling and the distribution ratio of administrative counties, the sample size was based on the following equations (Chu 1996):

$$n_0 = \frac{Z^2 PQ}{d^2}, \quad (1)$$

where  $n_0$  is the sample size without a correction factor,  $Z$  is the reliability coefficient,  $P$  is an acceptable ratio,  $Q$  is an unacceptable ratio, and  $d$  is maximum error of the estimate; and

$$n = \frac{n_0}{1 + n_0/N}, \quad (2)$$

where  $n$  is the desired sample size with a correction factor, and  $N$  is the population size.

Based on a preliminary pre-questionnaire, the acceptable ratio,  $P$ , was estimated to be 0.8, and the maximum error of the estimate,  $d$ , and the value of  $Z$  were respectively assessed as 0.05 and 2. The value of  $n_0$  after calculation using equation (1) was 256. The population size, i.e., the grand total of households in Taiwan area in 2010, was 7,839,175 (DHR 2010). Inserting this number into equation (2), we obtained the desired sample size as the same result of 256. In order to increase the response rate of the questionnaire and estimate the presence of a non-response bias, 3600 questionnaires were separately mailed twice: the first wave was in May with 2000 sheets, and the second wave was in June with 1600 sheets. For the non-response bias evaluation, we adopted a method described by Armstrong and Overton (1977): the second wave of respondents was regarded as non-respondents in the first wave. Differences in the means of the 2 respondent groups were compared using independent  $t$ -tests. No sig-

nificant differences were detected between the 2 respondent groups. In total, 363 questionnaires were received from the 2 mailings. After omitting invalid questionnaires, we ultimately obtained 350 valid questionnaires for a response rate of 9.7%.

### Data analysis

Valid questionnaires were processed using the statistic tool "Statistical Product and Service Solutions vers. 12.0" (SPSS; IBM, Armonk, NY, USA) for descriptive statistics, Chi-squared test, and analysis of variance (ANOVA), so that we were able to understand relationships between demographic information and factors of consumer recognition of the CAS label, their purchase experiences, and their repurchase willingness.

## RESULTS AND DISCUSSION

### Demographic characteristics

The demographic characteristics of the 350 valid respondents were analyzed including gender, marital status, age, educational level, occupation, family revenue, number of family members, personal income, and residence location. Table 1 shows the analyzed results. As to gender, males comprised 40.6% and females 59.4%. This result was similar to surveys by Li (2004) and Li et al. (2005), in which there were more female than male respondents. As for the marital status, 65.7, 28.9, and 4.3% of respondents were respectively married, unmarried, and currently single. As to the age distribution, most people were in the 60~64 yr (15.7%) age group, followed in order by 50~54 (12.3%), 25~29 (12.0%), and 45~49 yr (10.6%). For educational level, 30.9% of respondents had graduated from university, followed those who had finished senior high school (25.7%) and junior college (20.0%). As to occupa-

tions, civil servants comprised the largest group (18.6%), followed by businesspeople (16.9%) and housekeepers (14.6%). Laborers (12.9%) and the self-employed (12.9%) had the same proportion. For family monthly revenue, the majority of surveyed family earned NT\$40,001~60,000 and 20,001~40,000 (US\$1.00  $\approx$  NT\$30.1 in 2011), which accounted for 26.6 and 24.6%, respectively. This is currently a general range of family monthly income in Taiwan. As to the number of family members, 55.7% of families consisted of 3 or 4 people, which is the most common family structure, and in 42.3% couples, both earned money. The proportion of only 1 person earning money was next at 24.0%. Residence locations distributed in northern, central, southern, and eastern areas were 36.0, 29.1, 29.5, and 5.4%, respectively.

### Consumer recognition of the CAS label

In total, 289 (82.9%) respondents recognized the CAS label, and 12.0, 54.0, and 26.9% of them respectively expressed their confidence in certified agricultural products by CAS certification system as being "very highly trusting", "highly trusting", and "ordinary trusting". This means that > 90% of consumers in Taiwan appraised this semi-official certification system for agricultural products. Table 2 shows the percentage of respondents who "knew about" and "had purchased" items from the 14 categories of CAS-certified products. Products in the categories of meat, frozen foods, and egg products were most familiar to respondents, with percentages of 91.7, 85.1, and 63.1%, respectively. These results were similar to results of a study by Lin (2007) who surveyed consumer recognition of CAS-certified fisheries products. In that study, the ratio of respondents who had heard of CAS-certified products was 92.3%, but most respondents were only familiar with

**Table 1. Analysis of demographic characteristics of respondents in this study**

Item		Frequency	%	$\chi^2$	<i>p</i>
Gender	Male	142	40.6	194.10	0.00 <sup>2)</sup>
	Female	208	59.4		
Marital status	Married	230	65.7	386.21	0.00 <sup>2)</sup>
	Unmarried	101	28.9		
	Single	15	4.3		
	No response	4	1.1		
Age (yr)	≤ 24	34	9.7	81.88	0.00 <sup>2)</sup>
	25~29	42	12.0		
	30~34	36	10.3		
	35~39	30	8.6		
	40~44	35	10.0		
	45~49	37	10.6		
	50~54	43	12.3		
	55~59	34	9.7		
	60~64	55	15.7		
	≥ 65	4	1.1		
Education level	Under elementary school	5	1.4	260.80	0.00 <sup>2)</sup>
	Elementary school	21	6.0		
	Junior high school	20	5.7		
	Senior high school	90	25.7		
	Junior college	70	20.0		
	University	108	30.9		
	Graduate school and above	35	10.0		
	No response	1	0.3		
Occupation	Civil servant	65	18.6	121.82	0.00 <sup>2)</sup>
	Laborer	45	12.9		
	Businessperson	59	16.9		
	Self-employment	45	12.9		
	Housekeeper	51	14.6		
	Student	26	7.4		
	Agricultural industry	3	0.9		
	Waiting for job	9	2.6		
	Other	37	10.6		
	No response	10	2.9		
Family revenue (NT\$/month) <sup>1)</sup>	< 20,000	42	12.0	104.30	0.00 <sup>2)</sup>
	20,001~40,000	86	24.6		
	40,001~60,000	93	26.6		
	60,001~80,000	49	14.0		
	80,001~100,000	35	10.0		
	> 100,000	38	10.9		
	No response	7	2.0		

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Number of family members	1	11	3.1	498.54	0.00 <sup>2)</sup>
	2	46	13.1		
	3 or 4	195	55.7		
	5~7	92	26.3		
	> 7	5	1.4		
	No response	1	0.3		
Number of persons with an income	1	84	24.0	238.24	0.00 <sup>2)</sup>
	2	148	42.3		
	3	59	16.9		
	4	35	10.0		
	> 4	14	4.0		
	No response	10	2.9		
Residence location	Northern area	126	36.0	186.57	0.00 <sup>2)</sup>
	Central area	102	29.1		
	Southern area	103	29.5		
	Eastern area	19	5.4		

<sup>1)</sup> US\$1.00  $\approx$  NT\$30.1 in 2011.

<sup>2)</sup> Significant at the  $p < 0.05$  level.

**Table 2. Proportions of customers who knew about and had purchased different CAS-certified product categories**

CAS product category	Customers knew about		Customers had purchased	
	Frequency	%	Frequency	%
1. Forest products	149	42.6	94	28.1
2. Meat	321	91.7	284	84.8
3. Frozen foods	298	85.1	276	82.4
4. Fruit and vegetable juice	137	39.1	107	31.9
5. Quality rice	194	55.4	158	47.2
6. Preserved fruits and vegetables	75	21.4	40	11.9
7. Ready-to-serve meals	75	21.4	54	16.1
8. Refrigerated foods	207	59.1	166	49.6
9. Fresh edible mushrooms	159	45.4	118	35.2
10. Fermented foods	93	26.6	57	17.0
11. Snack foods	110	31.4	83	24.8
12. Egg products	221	63.1	197	58.8
13. Minimally processed fruits and vegetables	129	36.9	99	29.6
14. Aquatic products	132	37.7	97	29.0
Total	2300	657.2	1830	546.3

certified meat products. With regard to “had purchased”, we obtained the same sequence of the percentages for “knew about” of 84.8, 82.4, and 58.8% for meat, frozen foods, and

egg products, respectively. However, only 42.6% of respondents “knew about” certified forest products, which was  $< 50\%$ . On further analysis, the proportion of consumer who “had

purchased” forest products was only 28.1%. This means that the proportion of consumers who had not purchased certified forest products was > 70%. These results could be regarded as indicating that extension activities to promote certified forest products in the past few years were insufficient in their scope.

### Purchase experience with bamboo charcoal-related products

In the domestic market, particularly in the early development period, many bamboo charcoal-related products were not certified by the CAS system and did not possess the certification label. The market is still rife with uncertified products imported from Southeast Asia and China. In total, 258 (73.7%) respondents expressed that they had purchased bamboo charcoal-related products (including certified and uncertified bamboo charcoal products). Compared to a similar survey by Li et al. (2005), in which only 24.8% of respondents had purchase experiences at that time, the results of this study showed that domestic consumers buying bamboo charcoal-related products had grown nearly 3-fold in the past 6 yr. Although the figures of purchasing greatly increased, to promote benefits for both manu-

factures and consumers from the CAS label, it is necessary to actively promote information to consumers that the CAS label involves certification of the quality of domestic bamboo charcoal-related products.

In addition, we further analyzed 149 consumers who knew about the category of certified forest products in the CAS system, regardless of whether they clearly knew about the actual items under the category of certified forest products. We found that the product of “bamboo charcoal slices” was the best-known by 71.1% of these specific consumers, followed by “bamboo charcoal pillows” and “deodorizing packages” at 65.8 and 54.4%, respectively (Table 3). The status of purchasing certified products by the 94 consumers who had purchased CAS-certified forest products had similar results: “bamboo charcoal slices” had the highest ratio of 81.9% who had purchased them, followed by “bamboo charcoal pillow” (71.3%) and “deodorization package” (60.6%).

Table 4 shows the statistics of respondents as to the channels through which they obtained information on bamboo charcoal-related products. The television had the highest ratio at 56.2%, followed by newspapers

**Table 3. Proportions of customers who knew about and had purchased” CAS-certified forest products**

Certified forest products	Customers knew about		Customers had purchased	
	Frequency	%	Frequency	%
1. Bamboo charcoal slices	106	71.1	77	81.9
2. Bamboo charcoal particles	63	42.3	44	46.8
3. Bamboo charcoal tubes	51	34.2	34	36.2
4. Bamboo charcoal pillows	98	65.8	67	71.3
5. Bamboo charcoal mattresses	63	42.3	48	51.1
6. Protect appliances for health	44	29.5	30	31.9
7. Deodorization packages	81	54.4	57	60.6
8. Distilled bamboo vinegar	56	37.6	41	43.6
9. Wood vinegar	42	28.2	32	34.0
Total	604	405.4	430	457.4

at 38.0% and books and magazines at 37.0%. This ranking of information channels was similar to the results of a study by Chou (1999) which analyzed CAS pork consumption behaviors. The internet at 31.5% was an important channel for obtaining information as well. In addition, introduction by salespeople (with a ratio of 28.8%) should not be ignored. That implies that a successful key factor is for manufacturers to exhibit their products by salesperson with good training to introduce consumers to the functions of bamboo charcoal-related products.

Table 5 shows the statistics of purchase places. The main place where these products were purchased was in shopping malls at 73.9%, followed by department stores at 47.1%, and other places, such as traditional

**Table 4. Statistics on information sources of bamboo charcoal-related products for consumers**

Information source	Frequency	%
1. Television	164	56.2
2. Internet	92	31.5
3. Newspapers	111	38.0
4. Books and magazines	108	37.0
5. Broadcasts	17	5.8
6. Relatives and friends	62	21.2
7. Salespeople	84	28.8
8. Others	30	10.3
Total	668	228.8

**Table 5. Statistics of places that CAS forest products were purchased by consumers**

Place of purchased	Frequency	%
1. Department stores	123	47.1
2. Shopping malls	193	73.9
3. Traditional markets	47	18.0
4. Night markets and street vendors	29	11.1
5. Convenience stores	26	10.0
Total	418	160.2

markets (18.0%), night markets and street vendors (11.1%), and convenience stores (10.0%).

### **Consumer satisfaction with and the willingness to repurchase bamboo charcoal-related products**

It is important for product marketing to know the level of satisfaction of consumers and their willingness to repurchase (Cronin et al. 2000, Lin 2002, Kotler 2003, Oliver 2010). Through an ANOVA, this study showed similar results of the relationship between consumer satisfaction and repurchase willingness having a significant difference ( $F = 3.025, p = 0.02$ ). In this study, around 3.7, 29.4, and 36.6% of the 256 general users of bamboo charcoal products expressed their satisfaction at levels of “very satisfied”, “satisfied”, and “common”, respectively. Only 3.1% of users said that they were “not satisfied”. This means that bamboo charcoal products did not meet their expectations after they were used (Table 6). Among them, the user groups of “very satisfied” and “satisfied” both had high repurchase willingness of 100 and 92.3%, respectively, and 96.1 and 85.4% would also highly recommend others to use bamboo charcoal-related products. However, half of the users group with a “common” level of satisfaction were willing to recommend that others use bamboo charcoal-related products, even though they had a 64.1% repurchase willingness. Basically, while the “very satisfied”, “satisfied”, and “common” groups all had repurchase willingness, the “not satisfied” and “very not satisfied” groups had almost no repurchase willingness. The integrated rate of repurchase willingness was 84.5%, which was lower than the results reported by Li et al. (2005) of 95.6%. The difference resulted from Li’s questionnaire design simply asking “Yes” or “No” for repurchase willingness,

**Table 6. Crosstab analysis of the connection of consumer satisfaction with purchase experience, repurchase willingness, and willingness to recommend bamboo charcoal products from among the 256 general users**

Item	Number/Satisfaction level				
	A <sup>1)</sup>	B	C	D	E
Consumers have experience using bamboo charcoal-related products	13 <sup>2)</sup>	103	128	11	2
	3.7 <sup>3)</sup>	29.4	36.6	3.1	0.6
Have repurchase willingness	13	99	82	1	0
	100.0	96.1	64.1	9.1	0.0
Will recommend others use bamboo charcoal-related products	12	88	64	1	0
	92.3	85.4	50.0	9.1	0.0

<sup>1)</sup> A, very satisfied; B, satisfied; C, common; D, dissatisfied; E, very dissatisfied.

<sup>2)</sup> Number of consumers.

<sup>3)</sup> Percentage (%).

but did not further investigate consumer satisfaction as did the questionnaire used in this study.

Compared to general users of bamboo charcoal products, users of CAS-certified bamboo charcoal product (94 respondent) appeared to have higher satisfaction from the proportions of “very satisfied” (8.5%) and “satisfied” (45.7%) (Table 7). The proportion of users with a “common” level of satisfaction was lower at 30.9%. That could mean that the quality of certified bamboo charcoal-related products by CAS was obviously higher than

that of non-certified products. However, by further comparing their “repurchase willingness” and “willingness to recommend others use bamboo charcoal-related products”, we found an interesting phenomenon that only the group with a “common” level of satisfaction with CAS-certified bamboo charcoal products had a higher level than the general bamboo charcoal products users. The groups of CAS-certified bamboo charcoal product users who were “very satisfied” and “satisfied” had a lower willingness to repurchase and recommend those products. This is difficult

**Table 7. Crosstab analysis of the connection of consumer satisfaction with purchase experience, repurchase willingness, and willingness to recommend CAS-certified bamboo charcoal products from among the 94 users**

Items	Number/Satisfaction level				
	A <sup>1)</sup>	B	C	D	E
Consumers have experience using bamboo charcoal-related products	8 <sup>2)</sup>	43	29	2	1
	8.5 <sup>3)</sup>	45.7	30.9	2.1	1.1
Have repurchase willingness	8	39	23	0	0
	100.0	90.7	79.3	0	0
Will recommend others use bamboo charcoal-related products	7	35	17	0	0
	87.5	81.4	58.6	0	0

<sup>1)</sup> A, very satisfied; B, satisfied; C, common; D, dissatisfied; E, very dissatisfied.

<sup>2)</sup> Number of consumers.

<sup>3)</sup> Percentage (%).

to explain under the circumstance of lacking further factors in this questionnaire.

Further analysis of the reasons that 20.8% of respondents stated that they “would not repurchase”, we found the main reason was that they “could not feel specific effects” from bamboo charcoal-related products (at 66.7%). The reason of a “high price” was the second main reason at 55.8%. The other reasons did not appear to be so important as the proportions were all < 30% (Table 8). The main reason could have occurred due to overstatement of the functions of bamboo charcoal products or a lack of clear product interpretation. Thus, it will be very important to determine how to reasonably promote the multiple functions and environmentally friendly character of bamboo charcoal-related products to consumers.

#### **Analysis of demographic characteristics related to CAS label recognition, purchase experience, and repurchase willingness**

Table 9 shows the results of a crosstabs  $\chi^2$ -test between the demographic characteristics of respondents and CAS label recognition, purchase experience, and repurchase willingness. At a significance level of  $p = 0.05$ , none of the demographic characteristics had a significant difference for repurchase willing-

ness. Significant differences only appeared in terms of age with CAS label recognition and occupation with purchase experience. For CAS label recognition, significant differences existed among age groups of over 60 yr (combining the groups of 60~64 and > 65 yr) (17.1%) > 50~54 (12.9%) > 25~29 (12.6%) > 30~34 (10.3%) > 40~44 (10.0%) > 45~49 and < 24 yr (9.7%) > 55~59 yr (9.4%) > 35~39 yr (8.3%). This means that the elderly paid more attention to information on food certification than did people in the other age groups. Therefore, the elderly group with high interest in certified products should not be ignored when popularizing activities of the CAS certification system are carried out in the future. To examine differences in purchase experiences, we merged the groups “agricultural industry” and “other” due to the small number of respondents, and the rank from high to low was civil servant (20.5%) > businessperson (16.3%) > housekeeper (15.9%) > self-employed (13.6%) > laborer (12.0%) > other (10.5%) > student (8.9%) > looking for a job (2.3%). It was conjectured that civil servants were more easily able to obtain related information on the semi-official CAS certification system than people with other occupations. This result is similar to that of a study by Li (2004) who obtained information on significant factors of consumer behaviors:

**Table 8. Statistics of reasons why consumers will not repurchase**

Reasons	Frequency	%
Could not feel specific effects	92	66.7
High price	77	55.8
Examination certification not known	42	30.4
Source not known	39	28.3
Family did not like	11	8.0
Outer appearance not good	10	7.2
Displeased experience after using	9	6.5
Others	6	4.3
Total	286	207.7

**Table 9. Crosstab analysis and  $\chi^2$  test of demographic characteristics to CAS label recognition (RC), purchase experience (PE), and repurchase willingness (WP)**

Demographic characteristic	RC		PE		WP		Remarks
	Pearson $\chi^2$	<i>p</i>	Pearson $\chi^2$	<i>p</i>	Pearson $\chi^2$	<i>p</i>	
Gender	4.182	0.124	0.238	0.888	0.462	0.497	
Marital status	7.336	0.119	2.383	0.666	5.935	0.051	
Age (yr)	55.398	0.000*	19.124	0.384	10.148	0.339	A, < 24; B, 25~29; C, 30~34; D, 35~39; E, 40~44; F, 45~49; G, 50~54; H, 55~59; I, > 60.
Educational level	10.770	0.549	8.951	0.707	2.002	0.920	
Occupation	21.145	0.173	18.915	0.015*	9.670	0.289	A, civil servant; B, laborer; C, businessperson; D, self-employed; E, housekeeper; F, student; G, looking for job; H, other.
Family revenue	10.830	0.371	15.381	0.119	6.349	0.274	
Number of family members	8.954	0.356	4.116	0.846	2.057	0.725	
Number of persons earning money	6.673	0.572	10.676	0.221	6.328	0.176	
Residence location	5.108	0.530	1.035	0.984	1.837	0.607	

<sup>1)</sup>  $p < 0.05$ .

civil servants paid more attention to basic functions and environmentally friendly demand of bamboo charcoal-related products than did housekeepers and businesspeople.

## CONCLUSIONS

The CAS logo represents the certification label of Taiwanese premium agricultural products and has been implemented for over 20 yr in Taiwan. The main CAS-certified products focus on fresh agricultural goods and their processed products. Among them, the products of “meat” and “frozen foods” have the longest history in the certification system, and have gained consumers’ highest recognition and trust. Bamboo charcoal- and bamboo vinegar-related products have been included in the CAS certification system since 2005.

Although there was a high proportion (82.9%) of consumers who recognized the CAS label and > 90% of consumers who expressed high trust in the product quality certified by the CAS certification system, only 42.6% of consumer knew about CAS-certified forest products and only 28.1% had purchased CAS-certified forest products. The low proportion was only 1/3 of the integrated consumers who had purchase experience with bamboo charcoal products (73.7%). The main reason that consumers who had purchased bamboo charcoal-related products would not repurchase such products was that they could not feel their specific effects. Therefore, to promote the benefits to both manufactures and consumers from the CAS label, it is absolutely necessary to raise awareness of consumers that the CAS label involves quality certification of domes-

tic bamboo charcoal-related products. There were insufficient popularizing activities in the past few years. Because there was a significant connection between consumer satisfaction and repurchase willingness for bamboo charcoal-related products, in order to avoid consumers from having excessive expectations of bamboo charcoal-related products, it will be very important to reasonably promote the multiple functions and environmentally friendly characters of bamboo charcoal-related products to consumers. In addition, the two groups of the elderly aged over 60 yr and civil servants paid more attention to the certified agricultural products compared to those of other ages and with other occupations. These should be the focus of promotions of the CAS certification system in the future.

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