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What Matters When Purchasing Fresh Agri-Food for Taiwanese Consumers? A Best-Worst Scaling Approach

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Abstract

Consumers' food purchase decision is multifaceted and complex, which is not only influenced by product and process characteristics, but also by the present decision-making circumstances. This study investigates this complexity of consumers' food choice influenced by product and process characteristics, as well as by the decision-making circumstances (*i.e.* tactile sensory aspects of the product and shopping location), using best-worst scaling (BWS) methodology. BWS allows measuring the importance of different food buying criteria, thereby eliciting consumers' preferences. A total of 795 food consumers participated in a street-intercept interview performed in three cities of Taiwan. Results indicate that among the nine food purchase criteria (e.g. country-of-origin (CoO) labelling, production methods, chemical residue testing (CRT) information, price, shopping location, visual appearance, sense of touch, package size, and a recommendation given by a significant one), CRT information is the most important criteria in consumers' purchase decision, followed by CoO, production methods and hedonic characteristics. Three segments of consumers can be distinguished: the health-conscious purchasers (50.20%), the hedonic buyers (31.90%), and the origin-driven shoppers (17.90%).

Keywords

Best-Worst Scaling, Mixed Logit Model, Latent Class Analysis, Agri-Food

1. Introduction

The food market is an extremely complicated and widespread system. There is plenty to find out about how and why consumers choose food. For instance, it

could be the motive that a bar of chocolate, a carton of milk, or a piece of sweet pepper is produced in your local area or around the world; they could be produced underlying a conventional production method or an organic production method; they could be grown with numerous concentrated synthetic pesticides or just a few amounts of chemical inputs; they could be sold with a price premium or a discount price. Regarding the aforementioned attributes, without food labelling information consumers will neither be able to distinguish many food products on the shelves, nor be able to determine where and how the food is produced. Therefore, labels of product and process characteristics provide consumers with information for making adequate buying decision [1] [2].

The process of consumers purchasing food is multifaceted and complex. Numerous previous studies analysed consumers' food consumption, focusing on the impact of extrinsic observable cues such as (governmental regulated) food labelling (*i.e.* origin labelling, organic labelling, price) [3]-[9], many of which targeted to assess the impacts of food labels for consumers with regard to their food purchase decision. Particularly, along with escalating living standards and rising anxieties with respect to consumers' demands for information on food safety and quality, the importance of food origin and production methods has increased extremely [10]. Repeatedly the country of origin (CoO) labels have been discovered to be perceived as more important compared with labels for production methods [3] [8] [9] [11]. However, the increase in food business competitiveness often triggers additional difficulty for consumers who have to process plentiful information on food. Consumers' food purchase decision is rarely formed exclusively by visible product or process attributes. Rather, it is determined by a combination of different factors [12] [13]. Those include the visual and tactile sensory aspects of the product [14] [15] [16] during consumers' food shopping activity, the specific environment the purchase takes place (e.g. shopping location) [17] [18] as well as recommendations given by significant others (e.g. partners, family or friends) [19] [20]. Although many of those criteria are difficult to measure, they nevertheless might strongly impact consumers' food buying strategy.

The most ideal techniques to advance the understanding of which characteristics and combinations that lead consumers to purchase a particular food product was to utilize either discrete choice experiments (DCE) [9] [21] [22] or to explore choice-based experiments bounded to real consumer food purchases [23] [24] [25]. DCEs are an effective method for presenting various combinations of product's visible characteristics, named product concepts or alternatives, in which the participant is forced to trade off among different alternatives. Although the DCE method allows novel attributes and levels combinations to be included and examined for preference with respect to a specific food product, one of the DCE's drawbacks is its complex experimental design and the difficult interpretation of the analysed results. Especially, in the DCE design participants' individual purchase environment and personal decision-making condition (which is typically set identical in terms of e.g. the perceived sensory properties

such as the ripeness and the outer appearing of the studying object, as well as the individual shopping environment) are hard to be considered exclusively. Therefore, many researchers still tend to utilize the traditional rating scale (e.g. Likert scale 1 to 5 points) for consumer data recruitment. Predominantly it seems to smooth the data analysis and its interpretation of the analysed outputs. While the rating questions are easy for participants to respond; they may ineffectually discriminate between attributes/items and may face the difficulties to trade-off between attributes/items [26] [27] [28].

Given the complexity of consumers' (food) decision making behaviour and the potential scaling problem this paper uses the best-worst scaling (BWS) methodology [29]. BWS is a manifold choice extension of a paired comparison case. In BWS question, participants are requested to select the most preferred attribute/item (named "best") and the least preferred attributes/item (named "worst") in a BWS choice set. Cohen and Markowitz [30] state that there is only one mode for selecting the most and least preferred item in the BWS task. Participants are forced to discriminate among items and cannot dependably use the middle or end points as what they do for Likert scaling task. In addition, one advantageous point of employing BWS approach is that a complete ranking of the attributes analysed can be sufficiently obtained via the evaluation of how attributes relative to each other in the BWS data. Accordingly, the BWS results are more sensible and discriminating than rating scales [31]. As to the present study, the feasible details in designing and applying BWS experiment using food purchase related criteria will be expressed in the latter section of this paper.

Regarding the complication of the consumer decision making process, little is known about which food purchase criteria are actually of specific relevance for consumers, whether there are differences between consumer segments and if so, what are the profiles of those segments, Thus, this paper seeks to contribute to the broader study of consumers' food consumption behaviour. The purpose of this study is to understand Taiwanese consumers' preference for food purchase interrelated characteristics, not only considering the inward product-specific aspects but also the outer product-specific phases such as the store locations, personal sensory viewpoints and the impact of social norm acquisition, that have different extents of attributes appreciated. Hence, the study contributes to the food consumption literature twofold. Besides extrinsic food attributes it also considers other factors (e.g. shopping location, the aspect of social norm acquisition) potentially relevant in consumers' decision-making process. The random parameter logit model with hierarchical Bayesian estimation and latent class analysis are used to identify the preference heterogeneity in food preferences. Preference heterogeneity is investigated and characteristics of different consumer clusters are unfolded.

The remainder of the paper is structured as follows: Section 2 provides an overview of the conceptual framework and BWS choice experimental design, as well as the analytic method that is implemented; Section 3 reports the empirical specifications used in the model and the analysed results. Finally, a summary

and concluding remark are presented in the final section.

2. Method

There is considerable interest in the method of BWS of preference elicitation in many research fields, especially in the food marketing sector [32] [33] [34] [35]. BWS is an attributed-based methodology that asks interviewed participants to choose the "best" and "worst" items across a series of repeated BWS choice tasks. BWS was firstly introduced by Adam Finn and Jordan Louviere [29]. It is based on the random utility framework [36] [37] and used to measure the relative importance value that individuals attach to different items. The presents study uses the classic case [38] of the BWS method to investigate the preferences of Taiwanese consumers towards unpacked fresh agri-food. In order to construct the research as concrete as possible fresh unpacked sweet pepper was taken as exemplary object. It is a common seen household food ingredient in Taiwan and it is available in either conventional or organic quality, as well as in different production countries that were exemplified in this study. Hence, imaging a situation of sweet pepper purchase is therefore an easy task for study participants.

2.1. BWS Experimental Design and Instruments

An intensive literature review and a focus group video conference was conducted to ensure that the selected food-related items covered characteristics of importance to consumers and thus is relevant to influence consumers' decision making on food purchase. The items were pre-tested in the BWS experimental setting. The final nine selected items (see Table 1) were expressed as follows: 1) "*country of origin* (*CoO*)" was selected as an important criterion, because it has a greater impact on product evaluation particularly for low-involvement product [39] [40], such as food products; 2) "*production method*" is considered as an important BWS item by reason of the increasing organic food consumption among Taiwanese consumers due to the organic agriculture and

Table 1. Nine items used in BWS experimental design.

BWS Items
1) Country of origin
2) Production method
3) Chemical residue testing information
4) Price
5) Shopping location
6) Visual appearance
7) Sense of touch
8) Package size
9) Someone who is important to me recommend it

the organic food market have developed rapidly in Taiwan [41] [42] ; 3) "*chemical residue testing* (*CRT*) *information*" is included since the study on food safety topics shows that chemical and pesticide residues are important issues for consumers [43]. Particularly, after several food fraud incidences, information on CRT of food products are in some cases displayed by Taiwanese food retailers [44] [45] [46]; 4) "*price*" is known to be the driving force for consumer's purchase decision [47] [48]; 5) "*shopping location*" is considered owing to the finding reported by [49] and [50] that the choice of store location and the distance of store from home is a decision that a food shopper is fairly involved in their food purchase decision making process; 6) "*visual appearance*" and the 7) "*sense of touch*" are concerned in the BWS design, because visual and tactile multisensory evaluation influence overall consumer attitude towards products as well as the purchase intentions [51] [52] [53]; 8) "*package size*" is considered as an influential criterion in the BWS design. Scott *et al.* [54], Aerni *et al.* [55] and Wansink [56] found that the package size might affect the consumption behaviour; 9) "*recommendations by family and close friends*" are considered due to the social-influence effect that has been determined as a factor affecting consumption behaviour [57] [58]. Moreover, in the BWS choice design the exemplary descriptions of each item were used to ensure that the specification of each item referred to the same vision across participants.

A frequency balanced choice design[1] was generated using MaxDiff Designer v.6 [59] to maximize the BWS design efficiency [60] [61] in the BWS choice experiment. By employing such a design, a nine-item BWS experiment with 120 choice tasks was generated with 30 blocking versions, where each version of the BWS questionnaire had four BWS choice sets consisting of five items in a choice task (see **Figure 1**). The participants were requested to look at a set of items

Figure 1. Example of BWS choice task (translated English version).

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[1]A frequency balanced choice design creates an experimental design that features item frequency balance. A balanced design is one in which the one-way frequencies are almost equivalent (the frequencies each item appears across the entire design) and two-way frequencies are also nearly equivalent (the frequencies each pair of items appear within the same choice task across the entire experimental design). The orthogonality is reached when one-way and two-way frequencies are balanced.

making trade-offs among choice tasks, which item impacts their choice the most and least, and choose from each choice scenario the most important and the least important item in a BWS choice task. One advantage of BWS is its easiness for participants to respond, particularly when large numbers of attributes or items need to be compared [62] [63] [64].

Data were collected via standardized street-intercept computer-assisted interviews with consumers in the retail outlets in three biggest cities of Taiwan (New Taipei city, Kaohsiung city and Taichung city) in 2014. The questionnaire consisted of two parts. In the first part the BWS experiment was presented, while the second part included questions on information on food consumption habits and socio demographics.

2.2. Econometric Analysis

As regards the BWS analysis, a descriptive counting analysis was firstly conducted to have the initial picture of the BWS data. Subsequently, a hierarchical Bayesian mixed multinomial logit (MXL) model was applied to quantify the relative importance of the nine items for consumers' decision-making processes at the individual-level. The MXL model takes into account the heterogeneity in consumer preference and overcomes the major limitation of the standard multinomial logit model by allowing random variation and unrestricted substitution patterns for estimating the random coefficients logit model [65]. Following Louviere *et al.* [38], the econometrics formula with respect to the choice probability of the individual n of choosing item j as the best and j' as the worst can be specified as:

$$P = \frac{\exp\left(\beta_n X'_{nj} - \beta_n X'_{nj'}\right)}{\sum_{\substack{j, j' \in J \\ j \neq j'}} \exp\left(\beta_n X'_{nj} - \beta_n X'_{nj'}\right)} \tag{1}$$

where β_n is the individual-specific preference parameter vector obtained by individual n, X'_{nj} is the vector of observable explanatory variables including the chosen alternative j (the most important item is coded as 1, where the least important item is coded as −1, and non-chosen item is coded as 0). Assuming that an individual n choose item j and j' as the most important and the least important item in a choice scenario, respectively, out of a choice set of J items.

Additionally, we further examined the BWS data via latent class analysis (LCA) [66]. LCA allows investigating if there are distinct consumer segments that can be clustered based on their preference characteristics; therefore, consumers' preference heterogeneity inherent in the decision-making procedure can be uncovered. The number of latent classes is determined by the researcher based on the statistical measures of fit such as Percent Certainty (Pct. Cert.) [67] [68], Akaike Information Criterion (AIC) [69], Bayesian Information Criterion (BIC) [70], and chi-square scores. Finally, we utilized the Kruskal-Wallis non-parametric test [71] to examine whether different consumer segment significantly differ with respect to the demographic information.

3. Results and Discussion

The consumer survey was conducted with a sample of 1309 Taiwanese consumers in 2014. In total, 795 respondents (60.7%) were valid for the upcoming BWS modelling analysis. Participants were screened out if they were not (partly) responsible for their household food purchase as well as if they did not consume sweet pepper. Table 2 presents the summary of the socio demographic statistics of the interview sample. The results show that 45% of respondents were fully responsible and 55% of respondents were partly responsible for their household food shopping. 28.8% of survey participants were male and 71.2% female, reflecting that due to the cultural reason female consumers are still to a large extent responsible for the food preparation and purchasing in their household in Taiwan. The majority of the participants were in the age range of 30 to 49 years old (63.4%), married (61.5%), had a university degree (50.7%) and a monthly household net income over NT60,001[2] (44.9%). In general, we can say that the sample is biased towards younger, better educated and wealthier Taiwanese retail shoppers.

Table 3 presents the proportion of the best count and worst count of BWS data via the descriptive counting analysis. The "Best count proportion" and the "Worst count proportion" refer to the probability that participants choose an item as best or worst when it was available within a BWS choice task. It is calculated by the presence of times each chosen item was divided by the presence of times it was shown to participants (available for the BWS choice). The descriptive BWS results are aimed to provide a brief idea of consumers' preference. As to Taiwanese consumers' food shopping criteria, we observed that the highest best count proportion is the chemical residue testing information, followed by the country-of-origin and production methods in rank. The package size, a recommendation of a significant one and the shopping location are ranked the utmost worst count proportion.

Table 4 summarizes the results of the MXL model. The result of MXL model reveals that the most important criteria for consumers in their purchase of sweet pepper is information provided on chemical residue testing with the rescaled important score of 24.69; 95% C.I. [24.16, 25.23], followed by the CoO labeling (17.70; 95% C.I. [17.06, 18.34]), production methods (16.60; 95% C.I. [15.82, 17.38]), and the tactile sense of food (15.17, 95% C.I. [14.58, 15.75]). Conversely, the attributes shopping location (1.83; 95% C.I. [1.51, 2.16]), recommendation of others (1.44; 95% C.I. [1.18, 1.70]) and package size of the product (0.92; 95% C.I. [0.74, 1.11]) are according to our finding of least relevance. We also discovered that the results of MXL model and descriptive counting analysis showed a high level of consistency in the importance of food shopping criteria. The MXL empirical results are in line with previous findings [72] [73] [74] reveal that CoO labelling has a greater importance for consumers' preference formation than price. Betts *et al.* [75] investigated Chinese consumers' attitudes towards

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[2]In July 2014, 1 US Dollar = 29.98 New Taiwanese (NT) Dollars.

Table 2. Demographic statistics of the respondents.

N	795	
	Freq.	%
Shopping responsibility		
Full	358	45.0
Partly	437	55.0
Gender		
Male	229	28.8
Female	566	71.2
Age		
Up to 29	139	17.5
30 - 49	504	63.4
50 and over	147	18.5
n.a.	5	0.60
Living location		
North	197	24.8
Middle	315	39.6
South	270	34.0
Other (e.g. East or Islands)	13	1.60
Living Area		
Bid city	372	46.8
Middle size city	227	28.6
Rural area or countryside	196	24.7
Marital status		
Single	256	32.2
Married	489	61.5
Other (e.g. divorced/ widowed)	37	4.70
n.a.	13	1.60
Education		
Senior high school (12 years)	175	22.0
College	180	22.6
University and over	403	50.7
n.a.	37	4.70
Monthly net income in a household		
Up to NT 60,000	292	36.7
NT 60,001 and over	357	44.9
n.a.	146	18.4

Table 3. Descriptive counting analysis of BWS data.

BWS Items	Best count proportion	Worst count proportion
1) Country of origin	0.30	0.06
2) Production method	0.29	0.09
3) Chemical residue testing information	0.54	0.01
4) Price	0.20	0.11
5) Shopping location	0.04	0.45
6) Visual appearance	0.16	0.09
7) Sense of touch	0.23	0.05
8) Package size	0.02	0.47
9) Someone who is important to me recommend it	0.03	0.46

Table 4. Mixed multinomial logit model.

Number of aggregate participants		795	
Models		**Mixed multinomial logit model**	
Total "Best" Choices		3180	
Total "Worst" Choices		3180	
RLH[3] model fit statistics		0.61	
(0 to 100 rescaled importance scores)[4]	Rank	Importance score	95% C.I. [Lower, Upper]
1) Country of origin	2	17.70	[17.06, 18.34]
2) Production method	3	16.60	[15.82, 17.38]
3) Chemical residue testing information	1	24.69	[24.16, 25.23]
4) Price	5	11.29	[10.62, 11.97]
5) Shopping location	7	1.83	[1.51, 2.16]
6) Visual appearance	6	10.35	[9.76, 10.95]
7) Sense of touch	4	15.17	[14.58, 15.75]
8) Package size	9	0.92	[0.74, 1.11]
9) Someone who is important to me recommend it	8	1.44	[1.18, 1.70]

sustainability attributes of New Zealand kiwifruit and detected that at point of sale Chinese consumers favoured products free of chemical residues and of environmental-friendly production. In addition, Yeh and Hartmann [76] show that CRT information is perceived as more important than organic certification labelling in the discrete choice experimental setting; however, in their result of DCE it was perceived contradicting that the CoO labelling was the most impor-

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[3]RLH is the abbreviation for root likelihood and the model fit measure. RLH is a geometric mean of the standardized predicted likelihood values associated with the alternatives actually selected by participants. The higher the RLH value, the better the model fit.

[4]Concerning the interpretability of the results, the results are rescaled ranging from 0 to 100 scaling.

tant attribute. This might be explained by the practice of different scope of food purchase interrelated criteria and the study experimental design conducted in the experiment.

Table 6 presents the LCA findings of the BWS data. LCA is a technique of segmenting consumers into homogenous groups based on their preference structure [66]. The first step taken to formally identify the number of latent classes was based on the information criteria via examining how our LCA model performs as we increase the number of segments. Our results for segment selection are shown in Table 5. Information criteria statistics are calculated by evaluating the degree of improvement in explanatory power adjusted by the degrees of freedom [77] [78] [79]. Table 5 presents the four major (common seen) criteria of Percent Certainty (Pct. Cert.) [67] [68], Akaike Information Criterion (AIC) [69], Bayesian Information Criterion (BIC) [70], and chi-square scores used to determine the best latent class model fit. As there are many information criteria that can be calculated, and all provide few specific limitations corresponding to log likelihood statistics. According to the information criteria and the reference of model selection suggested by Nylund *et al.* [80], the LCA model with improvement across the greatest number of criteria [77] was identified and a three-class solution model specification was selected. In Table 5 the best solution for each criterion is shaded.

The LCA results revealed three distinct classes of food shoppers in Taiwan. Each consumer group consists of different preference structure (see Table 6 and Figure 2). Results of LCA revealed that consumers have heterogeneous preferences for different food related attributes when purchasing fresh sweet pepper.
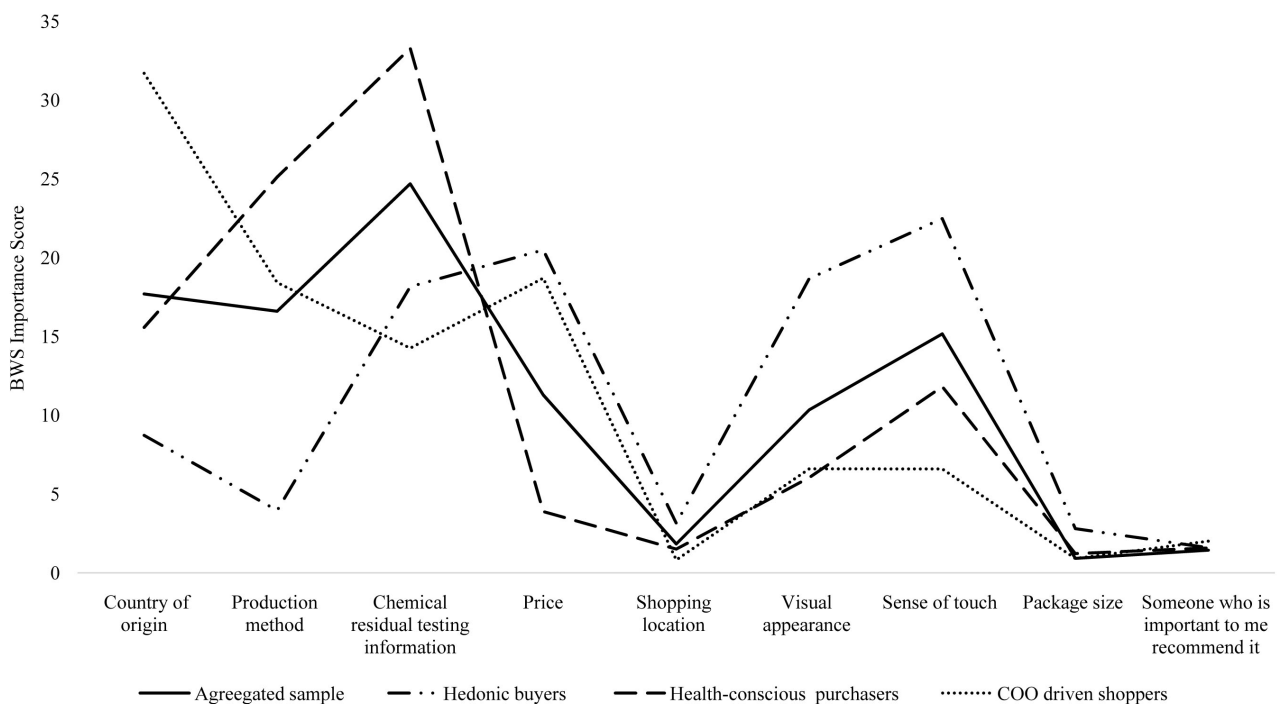
Figure 2. Rescaled importance scores for the aggregate sample (MXL results) and the three latent class sample (LCA results).

Table 5. Summary of best replications for latent class analysis (the best fit on each criterion is shaded).

Groups	Log-likelihood	Pct. Cert.	AIC	BIC	Chi-Square
2	−7,129.87	30.35	14,293.74	14,408.62	6,212.31
3	−6,967.91	31.93	13,987.82	14,163.52	6,536.23
4	−6,861.33	32.97	13,792.65	14,029.17	6,749.40
5	−6,769.25	33.87	13,626.51	13,923.85	6,933.54

Table 6. Latent class analysis.

Number of aggregate participants		795	
Models		**Latent class model**	
Log-likelihood for null model		−10,236.03	
Log-likelihood for restricted model		−6967.91	
Chi-Square		6536.23	
BIC		14163.52	
AIC		13987.82	
Segmentation description	**Hedonic buyers**	**Health-conscious purchasers**	**COO driven shoppers**
Segment Sizes	31.90%	50.20%	17.90%
(0 to 100 rescaled importance scores)[5]	Imprt. score	Imprt. score	Imprt. score
1) Country of origin	8.72	15.57	31.7
2) Production method	3.95	25.12	18.42
3) Chemical residue testing information	18.16	33.28	14.26
4) Price	20.49	3.89	18.7
5) Shopping location	3.14	1.5	0.82
6) Visual appearance	18.67	6.04	6.6
7) Sense of touch	22.48	11.81	6.59
8) Package size	2.8	1.22	0.91
9) Someone who is important to me recommend it	1.59	1.58	2.01

The biggest consumer group consists of *health-conscious purchasers* (50.20% of the sample); this outcome is in line with the finding reported by [81], [82], and [83]. This cluster represents consumers that reveal a strong focus on information regarding chemical residue testing and production methods but care less for price (compared to the other groups). Mauracher *et al.* [81] reported that consumers are interested in buying health-oriented organically-bred Mediterranean Sea bass at a higher premium price. Realini *et al.* [82] found that the "health conscious consumers" assigned highest importance to the health-related factor,

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[5]Concerning the interpretability of the results, author rescaled the results ranging from 0 to 100 and sum to 100 for the (group) sample.

e.g. with low levels of visible fat. Illichimann and Abdulai [83] discovered that health-conscious buyers trust organic labels and the benefits of organic attributes such as promotion of sustainable development, improvement of human health and animal husbandry. In addition, the members in this class are willing to pay a price premium in order to avoid conventional food. The second biggest class is the *hedonic group* (31.90%). The tactile sense and visual appearance of the sweet peppers are appreciated as important attributes for the *hedonic group*. In addition, this group is rather price sensitive. This is in agreement with [82], who determined a consumer group that is visual oriented and prefers bright red colour for beef and low meat prices. The third class, the *CoO-driven shoppers* (17.90%) perceived the CoO information to be the most relevant criterion when buying sweet pepper, followed with some distance by price and the labelling of production methods. While many of the previous studies have determined that the CoO information has played an important role in consumers' food consumption and preference [8] [81] [84], in our study findings also reveal the presence of a market segment interested in the CoO labelling of the foods.

Finally, the Kruskal-Wallis non-parametric test [71] was employed to further explore whether the three consumer groups significantly differ with respect to demographic variables among the segments. **Table 7** reveals that the three clusters are significantly different regarding age, living area and education. *Hedonic buyers* consist mainly of respondents who are older (over 50 years old), dwell in urban areas and possess a lower level of education (up to the degree of senior high school). As pointed out by [85] younger consumers attach less importance to sensory criteria whereas older respondents declared sensory factors very important for meat quality. *Health conscious purchasers* comprise respondents who are younger (up to 29 years old) and have a university degree. This result is in line with the finding reported by [28] that the younger the consumers; the greater importance they give to organic production specification, and [86] that higher educated consumers are more likely to perceive environmental effect of organic agriculture. The *CoO-driven shoppers* contain largely of middle age respondents (aged between 30 - 49 years old) who live in the mid-sized cities and hold a university degree. This support the finding of [87] that the middle age and the higher educated consumers pay a higher level of attention to the label of CoO.

4. Conclusions

Many scholars and marketers have been trying to find which food attributes have the highest impact on consumers' food choice and what are those consumers' profiles. As food is based on several (combined) attributes that might influence consumers in the process of their purchase decision making, this task is rather difficult to achieve. Particularly, consumers' food purchase decision is not only constructed exclusively by visible cues, but it is also determined by a combination of different outward factors. This study presents an empirical analysis of how food attributes influence decisions of consumers' food purchase decision

Table 7. Demographic profiles among three latent segments.

Number of total participants	795			
	Hedonic buyers	Health-conscious purchasers	COO driven shoppers	Asymp. Sig.
Sample size	31.90%	50.20%	17.90%	
	(%)	(%)	(%)	
Shopping responsibility				
Full	42.5	43.9	46.6	
Partly	57.5	56.1	53.4	
Gender				
Male	32.8	30.0	26.7	
Female	67.2	70.0	73.3	
Age				**
Up to 29	14.2	25.3	13.7	
30 - 49	59.7	58.9	67.4	
50 and over	24.7	15.8	18.1	
n.a.	1.5	0	0.7	
Living location				
North	36.6	25.7	20.3	
Middle	24.6	38.3	45.3	
South	38.1	34.8	32.1	
Other (e.g. East or Islands)	0.7	1.2	2.3	
Living Area				*
Bid city	54.5	45.5	45.1	
Middle size city	29.1	27.3	29.2	
Rural area or countryside	16.4	27.2	25.7	
Marital status				
Single	29.1	35.2	31.4	
Married	62.7	55.7	64.7	
Other (e.g. divorced/ widowed)	6.7	6.3	2.9	
n.a.	1.5	2.8	1.0	
Education				***
Senior high school (12 years)	30.6	15.8	23.0	
College	22.4	22.1	23.0	
University and over	43.3	54.5	50.7	
n.a.	3.7	7.5	3.3	
Monthly net income in a household				
Up to NT 60,000	22.9	37.1	37.8	
NT 60,001 and over	58.1	39.0	44.1	
n.a.	9.0	23.9	18.1	

***, **, * Demographics are significant at 0.1%, 1%, 5%, level with asymptotic method of non-parametric Kruskal-Wallis test among three latent segments.

in Taiwan. The BWS methodology of choice experiment is used to overcome the limitations of the traditional rating scales and to further investigate the effect of varying food related attributes as well as environmental factors in order to shed light on the determinants of consumers' purchase decision for sweet peppers. The participants are given BWS choice tasks and forced to make a trade off among items via indicating the most important and the least important item from each BWS choice task. Overall, the CRT information which has the greatest impact on respondents' choice, followed by the labelling of CoO, production methods and the tactile sense. In addition, the LCA results show that consumers can be segmented into three sub-groups based on their preference structure: The health-conscious consumers comprise the largest group (50.20%). Especially for younger and highly educated people, organic production is becoming an increasing factor in the food purchasing process. For such a case, an informative campaign or advertisement addressing the healthy impact of food could be a practical marketing strategy focusing on younger consumers. However, there are also groups of consumers placing a strong emphasis on sensory-oriented cues of the product (hedonic segment, 31.90%) and the CoO labelling (CoO driven shoppers, 17.90%). In a holistic marketing standpoint, a marketer has to discover a way to understand the needs and the demands of consumers, and further choose which markets to target and to keep consumers through delivering and communicating superior consumer value. The preference heterogeneity detected in the study can be therefore used by food marketers and traders to customize marketing and trading in order to offer differentiated products in line with consumer preferences, as well as developing a useful promotion strategy.

Some potential limitations of this study must be acknowledged when interpreting and concluding the generalizability of the results. First, the BWS experiment, though carefully designed to enable realistic responses, was undertaken in an unnatural and imaginative situation. This might reduce the external validity of the modelled estimates. Second, this study focused on one (agri-) product category, fresh sweet pepper, with participants choosing from within the portfolio of sweet pepper-related attributes. Therefore, the results are limited to the conditions tested and cannot be generalized to other product categories. In addition, it might be useful to consider food values related to food consumption patterns reported by [88], such as the aspects of tradition, fairness, and environmental impact, in the future research. Third, the author suggested that further research could connect a choice-based experiment with behaviour approaches, for example using structural behaviour modelling to investigate the cognitive and affective constructs influencing consumers' purchase decision. Fourth, it must be noted that there are nine attributes used in this study; however, including one additional attribute or removing a chosen one in the BWS design, the analytical results can be significantly changed. As in the BWS setting each attribute is evaluated respectively in relation to the other remaining attributes. Finally, this paper provides a better understanding and insights regarding to the importance of agri-food purchase related cues in Taiwanese consumers' food

choice using the BWS method. From the theoretical and methodological perspective, the author recommends taking the advantage of this method (given the fact it reduces participants' cognitive burden and force participants to trade off) to conduct further in-depth explorations.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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