ASSESSING CONSUMER BEHAVIOUR TOWARDS FISH SAUCE PRODUCTS BY USING FOOD CHOICE QUESTIONNAIRE

Le Thuy Linh[1, 2, *], Vuong Diu Ai[1], Nguyen Hoang Dzung[2], Le Minh Tam[1]

[1]Faculty of Food Technology, Ho Chi Minh City University of Food Industry, 140 Le Trong Tan, Tay Thanh Ward, Tan Phu District, Ho Chi Minh City

[2]Sensory Laboratory, Ho Chi Minh City University of Technology, 268 Ly Thuong Kiet, Ward 14, District 10, Ho Chi Minh City

[*]Email: *linhlt@hufi.edu.vnv*

Abstract. This study aims to assess Vietnamese consumer behaviour towards fish sauce product. It consists of two experiments. In the first experiment, consumer concept was explored using word association method. It was performed on 300 Vietnamese consumers with the prompt word as "fish sauce". The data were analysed by a triangulation method. The results evoke six factors associated with fish sauce as Sensory Appeal, Health, Price, Convenience, Traditional Value, Quality and Safety. These findings were the starting point for a modification of food choice questionnaire (FCQ) adapted to fish sauce product. In the second experiment, the modified FCQ with 18 items was used to assess the consumer behaviour. The survey was performed on 300 Vietnamese consumers. The data were analysed by using Exploratory Factor Analysis and Confirmatory Factor Analysis. The obtained model with five factors was adapted to fish sauce for Vietnamese consumers (χ^2/DF = 1.67, GFI = 0.93, CFI = 0.92, RSME = 0.47). In this, Sensory Appeal is the most important factor which might affect consumer food choice motivations. We expect that these results will be useful for the local manufacturers who want to develop traditional food products and/or enlarge national market.

Keywords: consumer behaviour, fish sauce, word association, food choice questionnaire.

Classification numbers: 1.5.1, 1.5.5.

1. INTRODUCTION

Since the early half of the 20th century, sensory science has grown rapidly and been used as a tool to support food product development process. Over the last two decades, the complexity of consumers has been increasingly acknowledged. Thus sensory researchers have become interested in studying other aspects of product consumption, for instance consumer concept and behaviour, which play an important role in consumer decision making process.

To address aspects of consumer concept, several qualitative methods have been added into the toolbox of sensory researchers. Among these methods, word association (WA) is frequently

used because of its easy application. WA has psychometric origins [1]. It is a qualitative method, which is based on the process of reminiscent in human perception. In the field of food science, WA has been widely applied to determine consumer concept towards, for instance, traditional food product [2], local food product [3], rice [4], green tea [5], well-being [6], and packaging [7].

To address aspects of consumer behaviour on food choice motives, Food Choice Questionnaire (FCQ) is the most frequently used tool. Its original form consists of 36 items, which were structured into nine factors [8]. Some authors showed that the nine factors proposed by were consistent across cultures, for instance, food choice motivations were studied in Japan, Taiwan, Malaysia, and New Zealand [9], in Canada, Belgium and Italy [10], and in Belgium, Hungary, Romania, and Philippines [11]. Nevertheless, in practices, these current factors as well as their items could not cover diverse research contexts. Therefore, FCQ were modified for an adaptation to particular research aims, populations and/or languages [12]. For instance, Fotopoulos et al. (2009) proposed a short version of FCQ in which the "ethical concern" factor was eliminated for Greek people [13]. Honkanen and Frewer proposed a modified FCQ in which the three items as animal welfare, political and religious values were taken into account for Russian people [14]. More recently, Pieniaka *et al.* proposed a modified version of FCQ with the mood factor excluded for subjects in six European countries (Belgium, France, Italy, Norway, Poland, and Spain) [15].

Fish sauce is a very popular and traditional condiment in most of Eastern countries, such as: Korea, Indonesia, Thailand and Vietnam. Since Vietnam officially became a full member of ASEAN and WTO, fish sauce products in particular and other traditional products in general can be easily exchanged across countries. From a positive aspect, this is an opportunity to enlarge the national market for domestic products. But still, from a negative aspect, domestic products have a certain amount of competition. So understanding the consumer concept and behaviour towards traditional food products (TFPs) is of crucial importance as this could help domestic businesses increase their competitive position in the marketplace.

This study aimed to assess the consumer concept and behaviour towards fish sauce products. It consists of two parts. First, the concept of fish sauce products was explored using WA method. The obtained results were the basis to modify the FCQ adapted to fish sauce. The modified questionnaire was validated before being used to measure the behaviour of Vietnamese consumers.

2. MATERIALS AND METHODS

2.1. Exploring consumer concept using word association

WA task consists of three following steps. Step 1 – Introduction – The experimenter explains to subjects that they will receive a prompt word, and they are asked to elicit three words (or phrases) that come to mind. The time taken for each word is limited to a maximum of 30 seconds. There is no right or wrong answers. Step 2 – Warm up – To make subjects familiar with the task, a prompt word "spring" was presented to each subject. Once the subject understood the task, he/she moves to the next step. Step 3 – Main task – Subjects were presented the prompt word as "fish sauce."

This experiment was conducted in Ho Chi Minh City using a convenience sample. Solely the subjects who consumed fish sauce at least once per week were recruited. Table 1 represents the demographic characteristics of 300 subjects participated in this study. For analyzing the data,

the words elicited were counted and their frequencies were then graphically illustrated by means of word cloud. In addition, these elicited words were grouped into categories based on their similarity by triangluation method. In other words, three independent consumer researchers were incharge of categorization task. These results are the starting point to modify the current FCQ adapted to fish sauce. This provisional FCQ will be used for the next step.

Table 1. Demographic characteristics of participants in word association method.

Gender (%)		Education (%)	
Female	67.3	University	88
Male	32.7	High school	11.3
Region (%)		Under high school	0.7
South	54.6	*Frequency of use (%)*	
Middle	31.7	Daily	68
North	13.7	Normal	20.7
Age (years)		Sometimes	11.3
20 – 24	62.3	*Occupation (%)*	
25 – 35	21	Full-time job	41.3
>35	16.7	Part-time job	12.7
		Student	41.7
		Retire	0.7
		Housework	3.6

2.2. Assessing consumer behaviour using food choice questionnaire

The provisional version of FCQ in our research context consists of six factors. In this four factors were inherited from the original version of FCQ and other two factors were obtained from WA experiment. The survey was performed on 300 subjects, whose demographic characteristics was presented in Table 2. Table 3 represents the 24 items/statements of the FCQ developed for this study. Each item (i.e. statement) was evaluated using a five-point Likert scale from 1 = strongly disagree to 5 = strongly agree. All statements begin with "When I choose fish sauce products, the important thing is that…".

Table 2. Demographic characteristics of 300 subjects in Food Choice Questionnaire.

Gender (%)		Education (%)	
Female	66.3	University	89
Male	33.7	High school	10.3
Region (%)		Under high school	0.7
South	65	*Frequency of use (%)*	
Middle	22	Daily	68
North	13	Normal	25
Age (years)		Sometimes	21
20 – 24	57.7	*Occupation (%)*	
25 – 35	18.7	Full-time job	51.7
>35	23.6	Part-time job	11
		Student	34.3
		Retire	0
		Housework	3

Table 3. Motivation factors and survey items.

Factor	Item No.	Code
When I choose fish sauce, the important thing is that …		
1. Sensory appeal*(Se)		
Tastes good	Item 13	Se1
Smells nice	Item 3	Se2
Eye-catching packaging	Item 17	Se3
Distinctive brownish color	Item 14	Se4
Has a pleasant texture	Item 19	Se5
2. Health*(He)		
Keeps me healthy	Item 2	He1
Contains lots of protein, vitamins, omega-3, iron and lysine	Item 16	He2
Eating with fish sauce will help us eat more, thus providing more active energy	Item 24	He3
3. Traditional value (Tra)		
Has origin of materials (geographical indications)	Item 4	Tra1
Is familiar with me and my family	Item 6	Tra2
Be processed/prepared in a special way	Item 12	Tra3
Is special product that reflects the nation or local culture	Item 15	Tra4
Is associated to specific celebrations of my country/family	Item 22	Tra5
4. Quality and safety (Qu)		
Get certification of Vietnam high quality goods by consumers	Item 7	Qu1
Conform to Vietnam or global quality standard	Item 5	Qu2
Has a clear origin of production	Item 20	Qu3
Has Eco-friendly packaging	Item 10	Qu4
5. Price* (Pr)		
Is not expensive	Item 11	Pr1
Is cheap	Item 24	Pr2
Is good value for money	Item 8	Pr3
6. Convenience* (Co)		
Is easy to prepare	Item 1	Co1
Takes no time to prepare	Item 18	Co2
Can be bought in shops close to where I live or work	Item 21	Co3
Is easily available in shops and supermarkets	Item 9	Co4

Note: Item number is used for questionnaire; Code is used for data analysis
*Reference: Steptoe, Pollard, & Wardle (Steptoe et al., 1995).

The survey data was analysed using exploratory factor analysis (principal component analysis and varimax rotation) to examine the underlying structure of the questionnaire. The number of factors was selected following criteria: (1) Kaiser's criterion and scree test where the factors with eigenvalues greater than 1.0 and above the "breaking point" on the scree plot were retained, and (2) a good interpretability of the factor. The number of items within each factor, the so-called internal consistency reliability, was selected by using Cronbach's alpha and corrected item-total correlation [16]. From the statistical point of view, Cronbach's alpha represents average correlations among items on a scale, normally greater than 0.6. Due to the fact that Cronbach's alpha are sensitive to the number of items in the scale, the corrected item-total correlations could also be reported, with acceptable values greater than 0.3 [17]. The CFA model was assessed using maximum likelihood estimation. Model fit indices presented include: Chi-square, Degrees of freedom (df), Root Mean Square Error of Approximation (RMSEA), the TuckerLewis Index (TLI), and the Comparative Fit Index (CFI). It is important to note that RMSEA < 0.08, TLI and CFI > 0.95 suggest an acceptance for model fit. The analysis was

conducted using the Statistical Package for Social Sciences (SPSS®) version 23 (IPM Corp, Armonk, NY, USA).

3. RESULTS AND DISCUSSION

3.1. The concept of Vietnamese consumers towards fish sauce product

Consumer concept provides an interesting insight into a particular product. In the context of this study, a list of 710 words was elicited from the prompt word "fish sauce" and represented in form of word cloud (cf. Figure 1). The larger size the word, the more frequently it was associated with the concept. The concept "fish sauce" was related to delicious, tasty, salty, smell, and traditional, etc. The elicited words were grouped into categories based on their semantic similarity by triangulation method. In other words, three independent consumer researchers were in charge. Table 4 represents eight categories/factors. Their percentage of occurrences are as following: sensory appeal (69.9 %), quality & safety (11 %), tradition (6.8 %), convenience (3.8 %), health (3 %), price (2.9 %), familiarity (2 %), and origin (0.6 %).

Figure 1. Word cloud for the prompt word fish sauce.

Table 4. Some of categories and words/phrase responding in word association with stimulus word "fish sauce".

Category	Word/phrase responding	Total (%)	Frequence
Sensory appeal	Delicious, tasty, easy eating, good smell, flavor, package, salty, brown, limpid	69.9	496
Quality & Safety	Safety, quality, hygiene, prestige, natural	11	79
Tradition	Traditional, long-standing	6.8	48
Convenience	Easy to buy, popular, usual	3.8	27
Health	Nutrient, good for health	3	21
Price	Price, cheap, reasonable price	2.9	21
Familiarity	Familiarity, habit, necessary, popular	2	14
Origin	Viet Nam, Phu Quoc, origin	0.6	4

The four factors sensory appeal, health, convenience, and price were retained in the modified FCQ. Due to the fact that they were not only refound in this study but also determined

in other studies [18 - 21]. In addition, "traditional value" and "quality and safety" were found as the two new factors adapted to fish sauce, (cf. Table 2).

3.2. The food choice motives of Vietnamese consumers towards fish sauce product

The internal consistency of the 24 items was assessed using Cronbach's α and Corrected Item-Total Correlations. Table 5 represents Cronbach's α values of six factors. As these values are greater than 0.6, it indicates a good internal consistency of the items within their factor, except for the health. Besides, the corrected item-total correlations are examined for their sign. As can be seen from the results, such recorded indices for the five factors were all positive. This suggests that the items were measuring the same underlying characteristics and none of them had been reverse-scored.

Table 5. Measure of scale reliability.

Factor	Item	Cronbach's Alpha	Corrected Item-Total Correlation	Mean
Sensory	Se1		.481	
	Se2		.392	
	Se3	0.744	.612	3.8
	Se4		.407	
	Se5		.659	
Health	He1		.325	
	He2	0.451	.306	3.8
	He3		.204	
Traditional value	Tra1		.316	
	Tra2		.434	
	Tra3	0.651	.457	3.9
	Tra4		.418	
	Tra5		.392	
Quality and safety	Qu1		.362	
	Qu2	0.632	.527	3.8
	Qu3		.423	
	Qu4		.353	
Price	Pr1		.543	
	Pr2	0.628	.435	3.6
	Pr3		.343	
Convenience	Co1		.438	
	Co2	0.704	.458	3.9
	Co3		.564	
	Co4		.500	

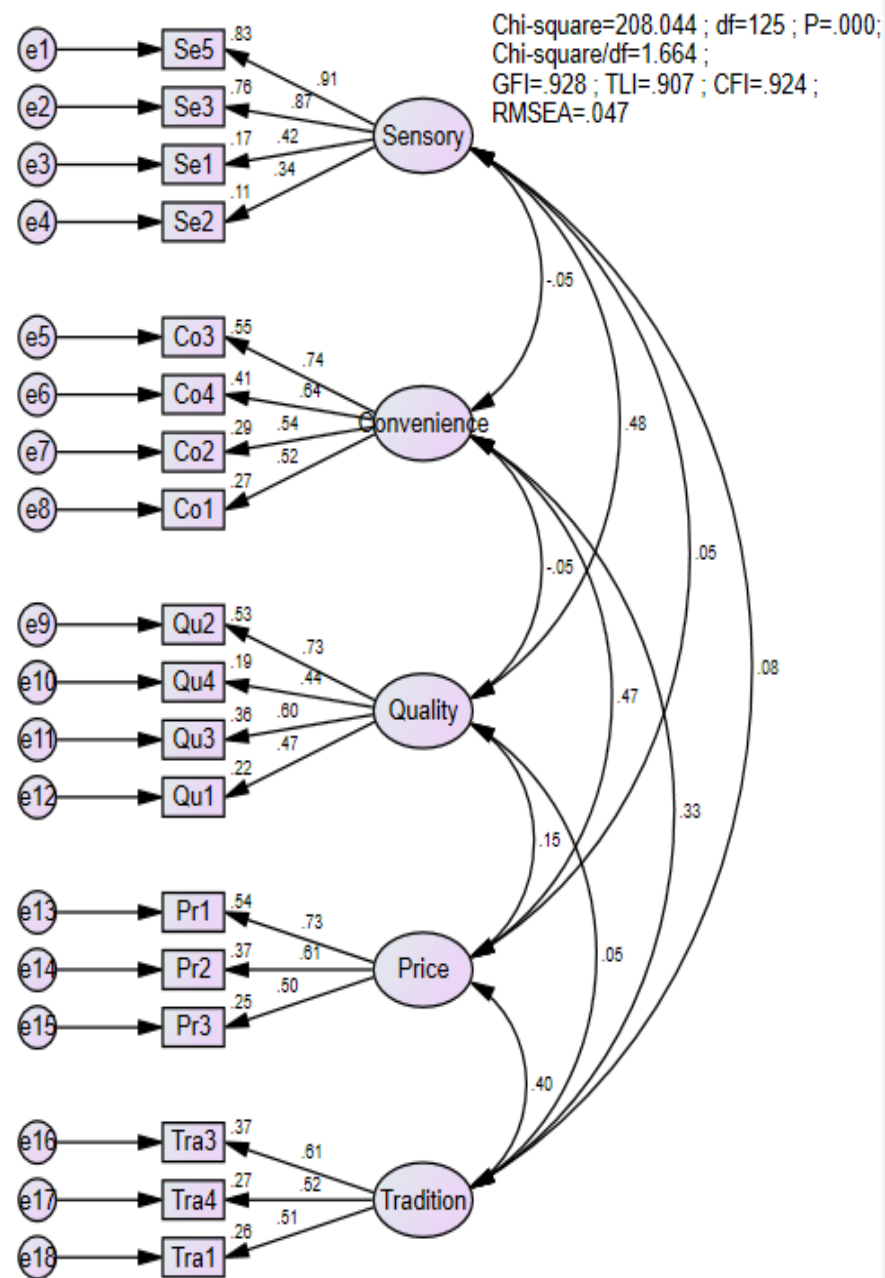*Note:* Cronbach's alpha on standardized items.

Figure 2. Confirmatory factor diagram of the five main motivations factors in the model

Table 6 represents the results obtained from EFA performed on a five factors model. With KMO = 0.71 and *p*-value < 0.05 for Bartlett's test of sphericity, this suggests that Sensory, Quality & Safety, Convenience, Price and Traditional value are the five factors more suitable when measuring food choice motivation. Figure 2 represents the CFA model along with its statistics (χ^2/DF = 1.67, GFI = 0.93, CFI = 0.92, RSME = 0.47). Such values are close to the standard meaning that the goodness of fit of the scale is acceptable.

Table 6. Exploratory factor analysis, item means, standard deviations, and item–total correlations.

Item	Factors					M	SD	I-T
	Se.	Con.	Q & S	Pr.	Trad.			
Se5	0.880					3.70	0.819	0.659
Se3	0.847					3.58	0.867	0.612
Se1	0.601					4.03	0.813	0.481
Se2	0.539					3.91	0.831	0.392
Co3		0.762				3.85	0.821	0.564
Co4		0.731				4.04	0.817	0.500
Co2		0.659				3.91	0.740	0.458
Co1		0.636				3.83	0.695	0.438
Qu2			0.760			3.57	0.984	0.527
Qu4			0.676			3.80	0.918	0.353
Qu3			0.656			4.18	0.869	0.423
Qu1			0.586			3.80	0.851	0.362
Pr1				0.840		3.65	0.901	0.543
Pr2				0.731		3.25	0.932	0.435
Pr3				0.554		4.02	0.814	0.343
Tra3					0.754	3.90	0.824	0.457
Tra4					0.730	4.06	0.806	0.418
Tra1					0.623	4.23	0.735	0.316

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Abbreviation: EV: Eigenvalues; Cum.: Cumulative %; M: Mean; Se.- Sensory; Q&S- Quality & Safety; Con.-Convenience; Trad.-Traditional value, Pr.- Price

4. CONCLUSION

This study highlights the food choice model with five factors (Sensory appeal, Quality & Safety, Tradition, Convenience, Price) adapted to fish sauce products for Vietnamese consumers. In this, Sensory Appeal is the most important factor which might affect consumer food choice motivations. In addition, this study retained two other important factors as "Quality and Safety" and "Traditional value", which were mentioned previously in the publication of [5]. Further research could be conducted to determine invariant factors toward traditional food products across time and product categories, especially for Vietnamese consumers. From the application's perspective, such factors are crucial in the context where the local manufacturers want to develop traditional food products and enlarge national market.

REFERENCES

1. Francis Galton - Psychometric experiments, (1880)
2. Luis Guerrero, Anna Clareta, Wim Verbeke, Geraldine Enderli, Sylwia Zakowska-Biemans, Filiep Vanhonacker, Sylvie Issanchou, Marta Sajdakowska, Britt Signe Granli,

Luisa Scalvedi, Michele Contel and Margrethe Hersleth - Perception of traditional food products in six European regions using free word association, Food Quality and Preference **21** (2) (2010) 225–233.

3. Katariina Roininen, Anne Arvola and Liisa Lähteenmäki - Exploring consumers' perceptions of local food with two different qualitative techniques: Laddering and word association, Food Quality and Preference **17** (1-2) (2006) 20-30.

4. Jung Soo Son, Vinh Bao Do, Kwang-Ok Kim, Mi Sook Cho, Thongchai Suwonsichon and Dominique Valentin - Understanding the effect of culture on food representations using word associations: The case of "rice" and "good rice, Food Quality and Preference **31** (2014) 38–48.

5. Le Thuy Linh, Le Minh Tam and Nguyen Hoang Dzung - Adaptation and validation of food choice questionnaire on traditional green tea products: A case study in Vietnam, Spise **53** (4B) (2015) 41-54.

6. Gastón Ares, Luisde Saldamando, Ana Giménez, Anna Claret, Luís M.Cunha, Luis Guerrero, Ana Pintode Moura, Denize C.R.Oliveira, Ronan Symoneaux and Rosires Deliza - Consumers' associations with wellbeing in a food-related context : A cross-cultural study, Food Quality and Preference **40** (2015) 304–315.

7. Betina Piqueras-Fiszman, Carlos Velasco, Alejandro Salgado-Montejo and Charles Spence - Using combined eye tracking and word association in order to assess novel packaging solutions : A case study involving jam jars, Food Quality and Preference **28** (1) (2013) 328–338.

8. Andrew Steptoe, Tessa M. Pollard and Jane Wardle - Development of a measure of the motives underlying the selection of food: the Food Choice Questionnaire, Appetite **25** (3) (1995) 267–284.

9. Prescott, Young 0'Neill, Yau and Stevens - Motives for food choice: A comparison of consumers from Japan, Taiwan, Malaysia and New Zealand, Food Quality and Preference **13** (7–8) (2002) 489 – 495.

10. Eertmans, Victoir, Notelaers, Vansant and Van den Bergh - The Food Choice Questionnaire: Factorial invariant over western urban populations?, Food Quality and Preference **17** (5) (2006) 344–352.

11. Januszewska, Pieniak and Verbeke - Food choice questionnaire revisited in four countries . Does it still measure the same?, Appetite **57** (1) (2011) 94–98.

12. Zoltán Szakály, Enikő Kontor, Sándor Kovács, József Popp, Károly Pető and Zsolt Polereczki - Adaptation of the Food Choice Questionnaire: the case of Hungary, British Food Journal **120** (7) (2018) 1474-1488.

13. Christos Fotopoulos, Athanasios Krystallis, Marco Vassallo and Anastasios Pagiaslis - Food Choice Questionnaire (FCQ) revisited. Suggestions for the development of an enhanced general food motivation model, Appetite **52** (2009) 199–208.

14. Honkanen and Frewer - Russian consumers' motives for food choice, Appetite **52** (2) (2009) 363–371.

15. Zuzanna Pieniaka, Perez-Cueto Federico and Verbeke Wim - Nutritional status, self-identification as a traditional food consumer and motives for food choice in six European countries, British Food Journal **115** (9) (2013) 1297–1312.

16. Keenan A. Pituch and James P. Stevens - Applied Multivariate Statistics for the Social Science (Sixth), Routledge, (2016) 339–387

17. Nguyen Dinh Tho - Phuong phap nghien cuu khoa hoc trong kinh doanh: thiet ke va thuc hien, NXB Lao dong Ha Noi, (2014) 588.

18. Zuzanna Pieniaka, Wim Verbeke, Filiep Vanhonacker, Luis Guerrero and Margrethe Hersleth - Association between traditional food consumption and motives for food choice in six European countries, Appetite **53** (1) (2009) 101–8.

19. Ou Wang, Hans De Steur, Xavier Gellynck and Wim Verbeke - Motives for consumer choice of traditional food and European food in mainland China, Appetite **87** (2015) 143–151.

20. Iraz Haspolat Kaya - Motivation Factors of Consumers' Food Choice, Food and Nutrition Sciences **7** (March) (2016) 149–154.

21. Jerko Markovina, Barbara J. Stewart-Knox, Audrey Rankin, Mike Gibney, Maria Daniel V. de Almeida, Arnout Fischer, Sharron A.Kuznesof, Rui Poínhos, Luca Panzone and Lynn J. Frewer - Food4Me study: Validity and reliability of Food Choice Questionnaire in 9 European countries, Food Quality and Preference **45** (2015) 26–32.