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Consumers' familiarity with and attitudes towards food quality certifications for rice and vegetables in Vietnam



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ABSTRACT

This study investigates consumers' attitudes towards, and familiarity with, food quality certification in selected urban areas in the South of Vietnam. Cross-sectional data were collected by means of a consumer survey ($n = 500$). Consumers' awareness of food quality-related terms was relatively low. Less than half the participants claimed to understand the meaning of good agricultural practices (GAP), organic food and sustainability. Consumers' familiarity with food quality certification (Vietnamese Good Agricultural Practices (VietGAP), Global Good Agricultural Practices (GLOBALG.A.P.), organic, and Hazard Analysis and Critical Control Points (HACCP)) was also low. Familiarity with food quality certification was positively associated with general attitude and food choice motives, namely food safety concern, perceived importance of healthy eating, and perceived importance of environmental consequences relating to food purchase. Food safety concern and perceived importance of environmental consequences were positively associated with consumers' attitudes towards safe vegetables, as well as high quality rice. Perceived importance of healthy eating was positively related to attitude towards high quality rice. Findings suggest that food safety aspects of safe vegetables and high quality rice should be emphasized during policy and marketing activities for food quality certification. Additionally, an increase in the perceived importance of environmental consequences relating to quality food purchase should be encouraged to enhance positive consumer attitudes towards quality food. Efforts to improve public awareness and knowledge of food quality certification and sustainable agricultural practices in developing countries such as Vietnam are highly recommended.

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1. Introduction

1.1. Study background

Attention to food quality and safety is increasing in developing countries (Aung & Chang, 2014; Grunert, Loose, Zhou, & Tinggaard, 2015; Jia & Jukes, 2013) driven by economic development, urbanization, increased out-of-home food options, and changes in consumption patterns for cereals, vegetables, fish, meat and dairy foods (Kearney, 2010). Furthermore, there is an increasing interest in environmentally friendly production in developing and emerging countries (Tait, Saunders, Guenther, & Rutherford, 2016;

Thøgersen, Zhou, & Huang, 2016). These trends have been strengthened by various factors, including the incidence of food safety crises, potential food risks from chemical use in food production and related risk communication or the lack thereof (Frewer et al., 2016; Lehtinen, 2017, pp. 150–174; Nougadère et al., 2014; Reisch, Eberle, & Lorek, 2013; Van Boxtael et al., 2013).

In Vietnam, food quality and safety have received increasing attention throughout the food supply chain. In the upstream supply chain, food safety issues are reported at the farm level, such as poor cultivation practices, the overuse and misuse of pesticides in agriculture (Buu, 2015; Hoi, Mol, & Oosterveer, 2013; Hong, 2016; Wertheim-Heck & Spaargaren, 2016) and the use of contaminated water, fertilizer and soil (Chau et al., 2014). At the next stage, unsafe post-harvest procedures are observed, such as using contaminated washing water (Ha et al., 2008) and poor food processing practices, such as the improper use of food additives (Le et al., 2017).

In the downstream supply chain, there are issues relating to the

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unclear origin of food products, poor handling practices and unhygienic operating conditions, e.g. among street vendors who occupy a very important place in food provisioning in Vietnam (Samapundo, Thanh, Xhaferi, & Devlieghere, 2016). As a consequence, food contamination (Chau et al., 2014; Ha et al., 2008) and food poisoning (Anh, 2015; Hong, 2016; VietnamNews, 2015) are a regular occurrence and cause serious problems. In the context of rising food safety-related incidents in Vietnam, it is important to investigate consumers' perceptions in relation to the health and food safety aspects of food quality.

In addition to food safety concerns, the environmental sustainability aspect of food production and consumption is emerging in Vietnam as in many other places (New Zealand Trade & Enterprise, 2014; Van Loo, Hoefkens, & Verbeke, 2017). The Vietnamese Mekong Delta (MKD) in South Vietnam has been known as the primary rice-producing area, as well as an important fruit- and vegetable-supply region for the country. The MKD is currently considered to be vulnerable to climate change and is facing severe environmental challenges due to the improper use of chemicals in agricultural activities (Berg & Tam, 2012; Dang, Li, Nuberg, & Bruwer, 2014). Consequently, it is important to obtain more sustainable farming practices for food production such as rice production in the MKD (Berg, Söderholm, Söderholm, & Tam, 2017). It is therefore relevant to investigate consumers' eco-friendly motives when purchasing quality food.

Finally, there is a growing interest in studies regarding food quality and safety standards in developing countries (Kirezieva et al., 2015; Sonntag, Theuvsen, Kersting, & Otter, 2016; Wongprawmas & Canavari, 2017). In the Vietnamese food market, there are different types of food quality certification and labels such as: Vietnamese Good Agricultural Practices (VietGAP), Global Good Agricultural Practices (GLOBALG.A.P.), organic, Hazard Analysis and Critical Control Points (HACCP) (Appendix A). The VietGAP and GLOBALG.A.P. certifications differentiate themselves from organic by allowing the proper use of chemicals in farming practices (Ministry of Agricultural and Rural Development (MARD), 2008). VietGAP is a national food quality and safety standard, issued in 2008 by the MARD following Decision No. 84/2008/QĐ-BNN and Decision No. 99/2008/QĐ-BNN. GLOBALG.A.P., formerly named Euro-Retailer Produce Working Group for Good Agricultural Practices (EurepG.A.P.), is a farm management practice standard, originally developed by European retailers. It is now the world's most widely applied farm certification scheme (GLOBALG.A.P., 2017). While GLOBALG.A.P. and VietGAP certified food can be found in large Vietnamese supermarkets, organic food is still limited to a niche market in Vietnam and is focused mainly in the metropolitan areas.

The current uncontrollable growth and lack of effective regulatory mechanisms for various food labels in the Vietnamese food market calls for an efficient management system for food quality certification and labelling in the country. Understanding consumers' familiarity with food quality labels is therefore relevant to provide insights into effective marketing strategies for such certification schemes and labels in Vietnam.

1.2. Study scope and objectives

The focus of our paper is on quality certification schemes, some of which place most emphasis on safety-related quality aspects (e.g., HACCP), while others have a broader emphasis than just safety-related aspects (e.g., VietGAP). Hence, in this paper, safety is one component of quality, which in itself is a broader and more encompassing concept.

This study focuses on consumers' familiarity with quality food and their food choice motives relating to health, food safety

concerns and eco-friendly aspects. Familiarity refers to "the number of product-related experiences that have been accumulated by the consumer" (Alba & Hutchinson, 1987, p. 411; Jacoby, Troutman, Kuss, & Mazursky, 1986) and plays a key role in consumer preference formation and decision making. Previous studies found positive associations between consumers' attitudes and environmentally friendly food choice motives (Smith & Paladino, 2010; Voon, Ngui, & Agrawal, 2011; Yadav & Pathak, 2016), health conscious food choice motives (Michaelidou & Hassan, 2008; Voon et al., 2011; Yadav & Pathak, 2016), and food safety concern motives (Hsu, Chang, & Lin, 2016; Michaelidou & Hassan, 2008). Food safety concern has a positive influence on the WTP for safe vegetables in Vietnam (Mergenthaler, Weinberger, & Qaim, 2009).

While it has been reported that Vietnamese consumers may have adequate levels of food safety knowledge (Samapundo et al., 2016), possible uncertainty about food quality and safety is one of the main barriers that consumers face in matching food choices to preferences (Verbeke, 2005). This study focuses on urban consumers as these consumers are strongly concerned about food-related issues and show increased demand for quality-labelled food in the context of Vietnam's fast economic growth and urbanization (Mergenthaler et al., 2009; Wang, Moustier, & Loc, 2014). Rice and vegetables were selected because they are the most common daily foods for Vietnamese consumers. Laillou et al. (2012) reported that rice consumption in Vietnam amounted to more than 300g/person/day. Additionally, Vietnam has one of the highest levels of per capita vegetable consumption in the world, with an average of 290g/person/day (Wertheim-Heck, Vellema, & Spaargaren, 2015).

There is an increasing interest in studies relating to food quality in Asia, as little is known about consumers' attitudes and behaviour towards food quality in this part of the world. Vietnam is the world's third-largest rice exporter (Food and Agriculture Organization of the United Nations (FAO), 2014), thus, rice production in the country makes an important contribution to global food security (Shrestha, Deb, & Bui, 2016). It is therefore important to conduct consumer studies in Vietnam to provide insights for value chain actors and policymakers to sharpen their marketing strategies for quality foods including rice. Since few studies have investigated consumers' attitudes towards food quality labels in the context of developing countries, such as Vietnam, this study seeks to address this knowledge gap by exploring how Vietnamese consumers think and behave in relation to food quality certification.

The specific objectives of this study are (1) to investigate consumers' familiarity with, attitudes towards, and possible food choice motives related to quality-certified foods based in Vietnam; (2) to analyse how food choice motives affect attitudes towards quality-certified food. Based on the results of the study, implications for marketing strategies for food quality labels in Vietnam are provided.

2. Materials and methods

2.1. Data collection

This study is based on a survey questionnaire that was developed following literature review, discussion with experts and related stakeholders, such as local consumers, authorities, retailers and traders in Vietnam. The questionnaire was translated from English into Vietnamese by professional translators. Pilot tests were conducted to verify the clarity of the questions and terms used. During June–July 2015, a total sample of 500 consumers completed the survey, equally distributed across two main urban areas in the South of Vietnam, Can Tho and Ho Chi Minh cities.

All participants were recruited at the entrance to local markets

Table 1
Characteristics of the sample (% , n = 500, Vietnam).

Gender		Occupation	
Male	16.8	Full time	48.2
Female	83.2	Part time	17.4
Age (years)		Retired	7.8
<30	21.2	Student	4.4
30–40	28.2	Unemployed (seeking work)	0.8
40–50	24.8	Not in paid employed (housewife)	21.4
50–60	19.6	Income (self-reported)	
>60	6.2	Low	12.8
Education		Medium	60.2
Elementary school	7.4	High	27.0
Secondary school	21.8		
High school	21.8		
Higher education (not university)	20.2		
University and upper	28.8		

and supermarkets in the urban areas of the two cities. After providing a brief introduction, consumers willing to participate were asked whether they were the primary food shopper for the household, and bought and consumed rice and vegetables, as inclusion criteria, in line with Moser and Raffaelli (2012).

The questionnaire first explored consumers' awareness of food quality-related terms and their familiarity with food quality certifications. Next, consumers' attitudes and behaviour towards rice and vegetables were investigated followed by an assessment of socio-economic characteristics.

The characteristics of the sample are described in Table 1. More than 80% of the participants were women, which is in line with the fact that women are more likely to be the main responsible food shopper. Participants were distributed across different age and education categories. Approximately 60% of the participants reported having medium financial status.

2.2. Measures

2.2.1. Awareness of food quality-related terms

Corresponding to food quality certification schemes, consumers were asked about their awareness of food quality-related terms such as sustainability, good agricultural practices (GAP), food safety, and organic food. Following Verbeke (2015), the possible answers included: (i) No, I have never heard of it, (ii) Yes, I have heard of it, but I don't know what it means, (iii) Yes, I have heard of it and I know what it means. Next, quality-related concepts, as used in this study, were introduced, including the concepts of "high quality rice" and "safe vegetables" as well as the related quality certifications (Appendix A).

2.2.2. Familiarity with food quality certifications

After the concepts had been introduced, participants were asked to indicate their familiarity with four food quality certifications, including VietGAP, GLOBALG.A.P., organic and HACCP. Familiarity was measured on a scale from "1 = not at all familiar", "2 = slightly familiar", "3 = moderately familiar", "4 = familiar", and "5 = very familiar". "Familiarity with food quality certifications" was calculated as the average of the four answers (Cronbach's $\alpha = 0.77$).

In order to analyse the differences between consumers who were and were not familiar with food quality certifications "Familiarity with food quality certifications" was recoded into "Unfamiliar with food quality certifications" (for score 1) and "Familiar with food quality certifications" (for scores 2–5). The same recoding into "Unfamiliar with ..." and "Familiar with ..." was applied for

VietGAP certification for analysis in relation to vegetables, and for HACCP certification for analysis in relation to rice.

2.2.3. Consumption frequency

Participants were asked how many times per week, on average, they consumed high quality rice ranging from never (0) to 14 times per week (twice a day). Participants were asked on how many days per week, on average, they consumed safe vegetables. An 8-point rating scale ranging from never (0) to 7 days per week (every day) was used.

2.2.4. Purchase intention

Consumers were asked how likely they expected, planned and desired to purchase high quality rice in the next 7 days using a 7-point interval scale ranging from "very unlikely" to "very likely" (Van Loo, Nguyen, Pieniak, & Verbeke, 2013). A similar question was used to measure the purchase intention for safe vegetables. The constructs "purchase intention for high quality rice" (Cronbach's $\alpha = 0.96$) and "purchase intention for safe vegetables" (Cronbach's $\alpha = 0.96$) were created by aggregating the scores across the three items (expect, plan, and desire to purchase).

2.2.5. General attitude and potential determinants

2.2.5.1. General attitude. General attitudes towards high quality rice and safe vegetables were measured by asking "Please indicate which word best describes your feelings about high quality rice /safe vegetables". Three bipolar items were scored on 7-point semantic differential scales: bad-good, unsatisfied-satisfied, terrible-delightful (e.g., Olsen, Scholderer, Brunsø, & Verbeke, 2007; Pieniak, Aertsens, & Verbeke, 2010). Aggregation across the three items resulted in a construct for general attitude towards high quality rice (Cronbach's $\alpha = 0.93$) and general attitude towards safe vegetables (Cronbach's $\alpha = 0.89$).

2.2.5.2. Potential determinants. In this study, potential determinants relating to food choice motives for rice to be investigated were: food safety concern, perceived importance of healthy eating, and perceived importance of environmental consequences. These motives are based on the credence quality aspects of food described in Becker (2000), which are currently of high importance in Vietnam, as indicated earlier.

Following Michaelidou and Hassan (2008), consumers' food safety concern in the case of rice was measured using the items: (1) I am very concerned about the amount of artificial additives and preservatives in rice; (2) The quality and safety of rice nowadays

concerns me. These were answered on a 7-point Likert scale (Cronbach's $\alpha = 0.83$).

Perceived importance of healthy eating in relation to rice was measured on a 7-point Likert scale from "1 = totally disagree" to "7 = totally agree", using the three statements "It is important to me that the rice I eat on a typical day [...] (1) is good for my physical and mental health; (2) keeps me healthy; (3) is nutritious (Pieniak, Verbeke, Scholderer, Brunsø, & Olsen, 2008) (Cronbach's $\alpha = 0.91$).

Adapted from Magnusson, Arvola, Hursti, Åberg, and Sjöden (2003), participants were exposed to statements about the perceived importance of environmental consequences relating to quality rice purchase. "When you purchase/would purchase high quality rice how important is it that this helps to [...]" (1) Improve the general state of the environment; (2) Reduce the use of artificial fertilizers in agriculture; (3) Reduce the use of herbicides and pesticides in agriculture. The items were measured on a 5-point scale from "1 = totally unimportant" to "5 = very important" (Cronbach's $\alpha = 0.87$).

Similar questions were applied to measure the potential determinants of consumers' attitudes towards safe vegetables: food safety concern (Cronbach's $\alpha = 0.82$), perceived importance of healthy eating in relation to vegetables (Cronbach's $\alpha = 0.88$), and perceived importance of environmental consequences relating to the purchase of safe vegetables (Cronbach's $\alpha = 0.86$).

2.3. Data analysis

Statistical analyses were performed with the software program SPSS 22.0 (SPSS Inc., Chicago, IL, USA) and STATA 13.0. Statistical significance was evaluated at $\alpha = 0.05$. Descriptive statistics such as chi-square association tests, independent sample t-tests, and one-way ANOVA were applied to profile consumers according to their familiarity with food quality certifications for rice and vegetables. The internal reliability consistency of the multi-item scales was assessed with Cronbach's α . Cronbach's α with a value of more than 0.7 indicates adequate internal consistency (Hair, Black, Babin, & Anderson, 2010). Individual item loadings for constructs with a value greater than 0.5 are acceptable (Hair et al., 2010). Adequate convergent validity is assessed using the average variance extracted (AVE) and should have a value higher than 0.5 for all constructs (Fornell & Larcker, 1981).

Two structural equation models (SEM), one for high quality rice and one for safe vegetables, were employed to investigate the associations between general attitude and potential determinants (i.e., perceived importance of healthy eating, food safety concern, perceived importance of environmental consequences). Firstly, maximum likelihood confirmatory factor analysis was performed for each model using the robust maximum likelihood procedure in STATA 13.0. Secondly, the SEM parameters were estimated and the goodness-of-fit for each model was evaluated using: Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Coefficient of Determination (CD). A satisfactory model fit was assessed based on several indices, such as the values below 0.08 for RMSEA and SRMR, above 0.90 for CFI and TLI (Hair et al., 2010); CD with a value of 1 corresponds to a perfect fit (StataCorp, 2013).

3. Results

3.1. Food quality certifications: familiarity and awareness

Vietnamese consumers' familiarity with food quality certifications is shown in Fig. 1. The degree of familiarity with each certification was quite low. More than 40% of the study participants were not at all familiar with VietGAP and organic, and more than 60% were not at all familiar with GLOBALG.A.P. and HACCP.

Consumers' awareness of food quality-related terms such as sustainability, GAP, food safety, and organic food is presented in Table 2. More than 30% of the study participants had heard about sustainability, GAP and organic food but indicated that they did not understand the meaning of these terms. Around 20% of the participants had never heard of GAP or organic food. The relationship between consumers' awareness of food quality-related terms and their familiarity with food quality certifications is also illustrated in Table 2. Consumers who were unfamiliar with quality certifications had lower awareness of sustainability, GAP, food safety, and organic food compared to those familiar with quality certifications.

Consumer characteristics for those familiar and unfamiliar with food quality certifications are reported in Table 3. Consumers who are familiar with food quality certifications are younger, on average, than those who are unfamiliar with food quality certifications. Those familiar with food quality certifications are also more likely

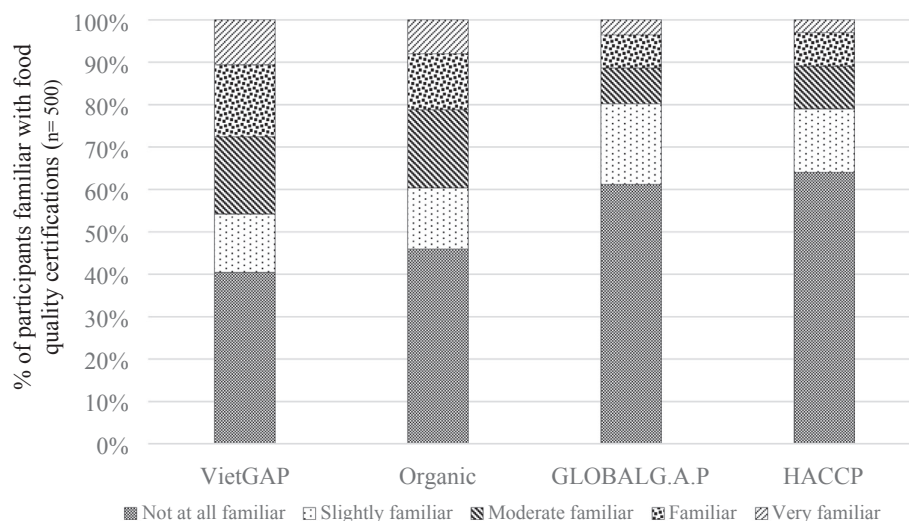


Fig. 1. Consumers' familiarity with food quality certifications (n = 500, Vietnam).

Table 2
Awareness of food quality-related terms by familiarity with food quality certifications (% , n = 500, Vietnam).

Items	Total (n = 500)	Unfamiliar with food quality certifications (n = 146)	Familiar with food quality certifications (n = 354)	Pearson Chi-Square	p-value
Awareness of sustainability				74.781	<0.001
I have never heard of it	16.6	39.0	7.4		
I have heard of it, but I don't know what it means	34.7	24.7	38.8		
I know what it means	48.7	36.3	53.8		
Awareness of good agricultural practice				38.428	<0.001
I have never heard of it	20.1	35.9	13.6		
I have heard of it, but I don't know what it means	35.5	36.6	35.1		
I know what it means	44.4	27.6	51.3		
Awareness of food safety				20.443	<0.001
I have heard of it, but I don't know what it means	18.0	30.1	13.0		
I know what it means	82.0	69.9	87.0		
Awareness of organic food				51.594	<0.001
I have never heard of it	20.8	39.7	13.0		
I have heard of it, but I don't know what it means	36.1	35.6	36.3		
I know what it means	43.1	24.7	50.7		

to have a higher level of education and a better financial status. They are likely to shop more in supermarkets than in local markets. On average, the price that consumers familiar with food quality certifications indicated that they would pay for 1 kg of rice was higher compared to those who were unfamiliar with food quality certifications. Also the average bag size consumers purchased was significantly smaller for those who were familiar with food quality certifications, which coincides with the fact that rice with certification is mostly sold in smaller packages in the Vietnamese food market. Alavi, Htenas, Kopicki, Shepherd, and Clarete (2012) reported that quality rice is often sold in supermarkets in small bags, for example, 5 kg per pack.

3.2. Food quality certification (VietGAP) for vegetables

VietGAP certification is the most popular and best known food

Table 3
Consumer characteristics based on familiarity with food quality certifications overall (% , unless specified otherwise, n = 500, Vietnam).

Items	Total	Unfamiliar with food quality certifications (n = 146)	Familiar with food quality certifications (n = 354)	Pearson Chi-Square/t-value	p-value
Mean age (years)	43.12		39.46	3.232 ^a	0.002 ^a
Age (years)				4.785 ^b	0.091 ^b
<30	25.7	19.9	28.0		
30–50	52.3	53.4	51.8		
>50	22.0	26.7	20.1		
Gender				2.992 ^b	0.084 ^b
Male	16.8	12.3	18.7		
Female	83.2	87.7	81.3		
Education				45.828 ^b	<0.001 ^b
Basic education	51.1	74.7	41.4		
Higher education	48.9	25.3	58.6		
Income (self-reported)				29.182 ^b	<0.001 ^b
Low	12.8	21.9	9.1		
Medium	60.1	65.1	58.1		
High	27.1	13.0	32.9		
Place of purchase of rice				75.154 ^b	<0.001 ^b
Supermarket	59.1	29.5	71.4		
Local market	40.9	70.5	28.6		
Bag size of rice (kg)				60.345 ^b	<0.001 ^b
0–10	25.6	2.1	35.4		
10–25	51.2	63.4	46.2		
>25	23.1	34.5	18.4		
Price of rice (VND per kg)	13,171		15,790	–9.322 ^a	<0.001 ^a

Note: for bag size of rice n = 485, for price of rice n = 486 and; Some prices given are estimates; a and b indicate the applied statistical test, namely independent samples t-test and chi square test, respectively.

quality certification for vegetables in Vietnamese supermarkets and stores. Therefore, we decided to explore consumers' attitudes, food choice motives and behaviour towards safe vegetables in relation to familiarity with VietGAP certification. Consumers who were familiar with VietGAP consumed safe vegetables more frequently, (3 times per week) compared to those who were unfamiliar with VietGAP. Consumers familiar with VietGAP certification also had a more positive attitude and a higher intention to purchase safe vegetables. They scored higher on food choice motives for vegetables, such as the perceived importance of environmental consequences relating to vegetable purchases, perceived importance of vegetables for healthy eating, and food safety concern than those who were unfamiliar with VietGAP certification (Table 4).

Table 4

Consumer attitudes, food choice motives and behaviour towards vegetables by familiarity with VietGAP certification (n = 500, Vietnam).

Items	Unfamiliar with VietGAP certification (n = 202)	Familiar with VietGAP certification (n = 298)	t-value	p-value
Frequency of consuming safe vegetables	0.09	3.02	-18.263	<0.001
Purchase intention towards safe vegetables	4.00	5.95	-12.933	<0.001
Attitude towards safe vegetables	5.40	6.31	-10.744	<0.001
Perceived importance of environmental consequences relating to the purchase of safe vegetables	3.77	4.40	-9.786	<0.001
Perceived importance of vegetables for healthy eating	5.42	6.30	-12.402	<0.001
Food safety concern towards vegetables	5.22	6.13	-9.912	<0.001

All constructs were measured on a 7-point scale except "Frequency of consuming safe vegetables" (0–7 frequency scale, per week) and "Perceived importance of environmental consequences" (5-point scale).

Table 5

Consumer attitudes, food choice motives, and behaviour towards rice by familiarity with HACCP (n = 500, Vietnam).

Items	Unfamiliar with HACCP certification (n = 320)	Familiar with HACCP certification (n = 180)	t-value	p-value
Frequency of consuming high quality rice	1.97	7.20	-9.691	<0.001
Purchase intention towards high quality rice	4.33	5.54	-7.975	<0.001
Attitude towards high quality rice	5.52	6.30	-8.574	<0.001
Perceived importance of environmental consequences relating to the purchase of high quality rice	3.85	4.34	-7.599	<0.001
Perceived importance of rice for healthy eating	5.61	6.34	-8.543	<0.001
Food safety concern towards rice	5.57	6.23	-7.540	<0.001

All constructs were measured on a 7-point scale except "Frequency of consuming high quality rice" (0–14 frequency scale, per week) and "Perceived importance of environmental consequences" (5-point scale).

3.3. Food quality certification (HACCP) for rice

HACCP certification is the most popular quality certification for rice in Vietnamese supermarkets and stores. Therefore, consumers' attitudes, food choice motives and behaviour towards rice were explored in relation to familiarity with HACCP certification (Table 5). Consumers who were familiar with HACCP consumed quality rice more frequently (7.2 times per week) compared to those who were unfamiliar with HACCP (2 times per week). Consumers who were familiar with HACCP certification had a higher purchase intention and a more positive attitude towards quality rice. They scored higher for different food choice motives for rice such as perceived importance of environmental consequences relating to rice purchases, perceived importance of rice for healthy eating, and they were more concerned about food safety than consumers who were unfamiliar with HACCP certification.

3.4. Factors affecting consumers' attitudes

Two exploratory factor analyses (EFA) were performed for the items included in the two models, one for high quality rice and one for safe vegetables. This yielded no cross-loadings of concern, i.e. equal to or above 0.40 (Hair et al., 2010). The corresponding confirmatory factor analyses (CFA) were performed and indicated that a three-factor solution is relevant for the data in the model for high quality rice as well as in the model for safe vegetables. The standardized factor loadings, reliability, and validity estimates were evaluated. The individual item loadings for the constructs were all highly significant with values between 0.77 and 0.91 in the model for high quality rice, and between 0.76 and 0.91 in the model for safe vegetables. The reliability estimates (i.e., Cronbach's α) for the constructs ranged from 0.83 to 0.91 in the model for high quality rice and from 0.82 to 0.88 in the model for safe vegetables, indicating adequate internal consistency (Hair et al., 2010). In addition, convergent validity was satisfied, with the average variance extracted (AVE) values for all constructs exceeding the threshold of 0.50 (Fornell & Larcker, 1981). Our results therefore fulfil the criteria for convergent validity for the internal constructs in each model

(Hair et al., 2010). Correlation coefficients between variables used in each model were assessed. All correlation coefficients were significant and below 0.70, indicating no concern over multicollinearity in the present data (Tabachnick & Fidell, 2001). The discriminant validity was assessed by adopting the procedure recommended by Hair et al. (2010). All variance-extracted estimates in each model were greater than the corresponding inter-construct squared correlation estimates. Thus, the constructs in each model satisfy the criteria for discriminant validity. These results confirm the theoretical constructs of the items to be included in the model for high quality rice and in the model for safe vegetables.

Based on the CFA, two structural models were performed to analyse factors that affect the general attitude towards high quality rice and safe vegetables (Table 6). Both models performed well, as supported by the satisfactory goodness-of-fit indices (model for high quality rice: $\chi^2 = 61.87$, $df = 38$, $p = 0.009$, RMSEA = 0.036, SRMR = 0.017, CFI = 0.994, TLI = 0.992, CD = 0.994; model for safe vegetables: $\chi^2 = 74.82$, $df = 38$, $p < 0.001$, RMSEA = 0.044, SRMR = 0.021, CFI = 0.990, TLI = 0.985, CD = 0.992). The model for high quality rice explained 39% of the variance in the general attitude of consumers towards high quality rice. The model for safe vegetables explained 43% of the variance in the general attitude of consumers towards safe vegetables.

Results showed that perceived importance of healthy eating is positively and directly associated with general attitude towards high quality rice, but not towards safe vegetables. In addition, food safety concern is positively and directly associated with attitudes towards safe vegetables as well as towards high quality rice. This indicates that people who are more concerned about food safety also have more positive attitudes towards safe vegetables and towards high quality rice. Finally, there are positive associations between the perceived importance of environmental consequences and attitudes towards high quality rice, as well as towards safe vegetables.

4. Discussion

This study investigates consumers' familiarity with, attitudes and perceptions towards quality certified food products, namely

Table 6
Standardized solution of the structural equation models for high quality rice and for safe vegetables.

	Attitude towards high quality rice			Attitude towards safe vegetables		
	Coefficient	SE	p-value	Coefficient	SE	p-value
Perceived importance of environmental consequences	0.34	0.13	0.008	0.58	0.12	<0.001
Perceived importance of healthy eating	0.27	0.08	<0.001	0.11	0.11	0.340
Food safety concern	0.23	0.08	0.005	0.24	0.09	0.008

SE: Standard Error; Model of high quality rice: $\chi^2 = 61.87$, $df = 38$, $p = 0.009$; RMSEA = 0.036, SRMR = 0.017, CFI = 0.994, TLI = 0.992; CD = 0.994; Model of safe vegetables: $\chi^2 = 74.82$, $df = 38$, $p < 0.001$; RMSEA = 0.044, SRMR = 0.021, CFI = 0.990, TLI = 0.985; CD = 0.992.

high quality rice and safe vegetables in Vietnam. The paper concentrates on different food quality certification schemes, including those that place most emphasis on safety-related quality aspects, such as HACCP, and others with a broader emphasis on quality beyond just safety-related aspects, such as VietGAP.

The degree of familiarity with food quality certifications among consumers in this Vietnamese study sample was relatively low. This is likely due to the fact that food quality certification and sustainable food consumption issues have only emerged in Vietnam in recent years (New Zealand Trade & Enterprise, 2014). Over 40% of the study participants stated that they understood some terms, such as good agricultural practices and organic food. However, when asked about their familiarity with specific quality certifications such as VietGAP and GLOBALG.A.P., only a very low proportion of participants (less than 10%) felt familiar with these certifications. This suggests that although people may be familiar with the concepts of production practices, such as good agricultural practices, most of them fail to recognise specific quality certifications. This result is similar to the findings of Sekovska, Branislav, and Bunevski (2013). Additionally, consumers' familiarity with HACCP certification was also relatively low. In accordance with Sekovska et al. (2013), the study found that consumers who are familiar with quality certifications are likely to have higher income levels, higher education, and tend to shop more in supermarkets than in the local markets. This corresponds to the fact that most food products with quality certifications are sold in supermarkets.

Our study revealed that consumers who are familiar with food quality certifications have a better knowledge of food quality-related terms, which is consistent with Zander, Padel, and Zanoli (2015). Consumers who are familiar with food quality certifications have a more positive attitude towards quality foods (Batte, Hooker, Haab, & Beaverson, 2007; Roitner-Schobesberger, Darnhofer, Somsook, & Vogl, 2008). However, this does not necessarily imply that the awareness and knowledge of food quality certifications will directly lead to the purchase of food with these labels. Nevertheless, it is likely that the more aware consumers are of food quality certifications, the more likely they are to appreciate quality certified food and food originating from sustainable agricultural practices.

Results of the structural equation models showed that perceived importance of environmental consequences of food choice is positively associated with attitudes towards high quality rice as well as towards safe vegetables. This is in line with findings from previous studies (Lee & Hwang, 2016; Smith & Paladino, 2010; Voon et al., 2011; Yadav & Pathak, 2016). In addition, food safety concern is positively related to attitudes towards safe vegetables, as well as towards high quality rice. This finding is consistent with Hsu et al. (2016), Lee and Hwang (2016), Mergenthaler et al. (2009), Michaelidou and Hassan (2008), and Liu, Pieniak, and Verbeke (2013). Microbiological contamination problems (Chau et al., 2014; Ha et al., 2008), chemical and pesticide contamination (Hoai, Sebesvari, Minh, Viet, & Renaud, 2011) have indeed been reported for fresh vegetables. Our study also showed that there is a positive association between food safety concern for rice and

attitude towards high quality rice. Rice samples were found to be contaminated with aflatoxin B1 in central Vietnam (Nguyen, Tozlovanu, Tran, & Pfohl-Leszkwicz, 2007) and in the mountainous area of North Vietnam (Huong et al., 2016). Additionally, Vietnamese rice was reported to face difficulties when entering the export market due to the issue of pesticide residues (Dao, 2016).

Results indicated that the perceived importance of healthy eating is positively associated with consumers' attitudes towards high quality rice, which is consistent with previous studies (Michaelidou & Hassan, 2008; Voon et al., 2011; Yadav & Pathak, 2016). Additionally, while perceived importance of healthy eating significantly influences attitudes towards high quality rice, this is not the case for safe vegetables. Johnson, Weinberger, and Wu (2008, pp. 11–12) mentioned that Vietnamese consumers eat, on average, a large daily amount of vegetables compared to consumers in other tropical Asian countries. Vegetable consumption in Vietnam has been reported at an average of 290g/person/day (Wertheim-Heck et al., 2015), and to have increased in recent years (Sitkova, 2015). Thus, consuming vegetables is a daily habit among Vietnamese consumers. In addition, our study revealed that approximately 90% of the study participants agreed that it is important that the vegetables they eat are good for their health, keep them healthy, and are nutritious. This means that the majority of consumers believe that eating vegetables is associated with healthy eating. However, as mentioned previously, food safety problems have been reported in relation to Vietnamese vegetables (Chau et al., 2014; Ha et al., 2008; Hoai et al., 2011). Typical examples of food safety issues are fresh fruit and vegetables without a clear indication of their origin, while improper use of agricultural chemicals is also quite common in Vietnamese primary production and markets. These problems and their consequences for human health are often publicised in the media (Buu, 2015; Hong, 2016; Nhien, 2014; Tam, 2016). Therefore, food safety concerns become more salient in the consumers' mind when purchasing food. The increasing prevalence of messages about food safety issues for vegetables in the Vietnamese food market might explain why safety concerns outweigh the perceived importance of healthy eating as drivers of Vietnamese consumers' attitudes towards safe vegetables.

The study faces two limitations. First, its sample is limited to consumers who live in two major Vietnamese cities, which limits generalisation to the overall Vietnamese population. Second, all survey data collected in this study are self-reported and may thus suffer, to some extent, from recall or social desirability bias, which limits extrapolation of the study findings to actual behaviour, for example.

5. Conclusion

Since there is a lack of knowledge about consumers' attitudes towards food quality labels in developing countries such as Vietnam, this paper contributes towards a better understanding of attitudes and motivations towards food quality certifications. The study showed that Vietnamese consumers' familiarity with food quality certifications was relatively low. Familiarity with food

quality certifications was positively associated with general attitudes and food choice motives (i.e. food safety concern, perceived importance of healthy eating, perceived importance of environmental consequences). Furthermore, consumers who were familiar with food quality certifications were likely to be younger, had higher levels of education and income, and were more likely to shop in supermarkets than those who were unfamiliar with food quality certifications.

Communication with a focus on improving the perceived importance of healthy eating, the perceived importance of environmental consequences and food safety concerns when purchasing rice is highly recommended to enhance positive attitudes towards high quality rice. Additionally, the positive attitude towards safe vegetables can be strengthened by concentrating the communication messages on the safety aspect of vegetables. Marketing efforts should attempt to improve consumers' familiarity with food quality certifications and increase their awareness and understanding. In addition, knowledge on sustainability and good agricultural practices should be publicly enhanced. These efforts can be piloted in urban areas where consumers have higher education levels, income and access to quality-certified food products. Currently, consumers find it difficult to recognise VietGAP products, which may result from the fact that there is no unified logo. Thus, evolving to one unified logo for VietGAP is recommended in order to increase consumers' familiarity with this certification. Since information asymmetry for food quality certification is an important issue for the food industry in Vietnam, further research to investigate consumers' attitudes and behaviour towards different quality certifications and labels relating to safety and sustainability is recommended.

Appendix A. Definition of concepts used in this study

High quality rice: 'High quality rice' refers to rice with clear information on the label, for example information detailing the origin, usage guide, taste, quality, safe production, environmentally friendly production. This rice usually originates from sustainable agricultural practices. High quality rice has certifications such as VietGAP, GlobalGAP, HACCP or organic.

Safe vegetables: 'Safe vegetables' refers to vegetables that have a clear origin and follow a production process that does not cause harm to human health. Safe vegetables have certifications such as VietGAP, GlobalGAP, organic. In this study, vegetables refer to any common types of vegetable that people consume with their daily meals, such as green leaf vegetables and root vegetables.

VietGAP (Vietnamese Good Agricultural Practices) is a national good agricultural practices standard for food issued by the Ministry of Agriculture and Rural Development. VietGAP consists of different criteria with respect to different agricultural products including vegetables, rice, fruit, etc. This is a food safety control and inspection program, starting from farm preparation, cultivation through to harvesting, post-harvest storage, taking into account the environment, any chemicals used, crop or plant protection products, packaging, as well as working conditions and the welfare of workers on farms. (<http://www.quacert.gov.vn/en/crops.iso268.html>)

GLOBALG.A.P. sets voluntary standards for the certification of production processes for agricultural products around the globe, using the production method that minimizes the negative environmental impacts of farming operations, reducing the use of chemical inputs and ensuring a responsible approach to worker health and safety, as well as animal welfare. (<http://www.iaf.nu/upFiles/GLOBALG.A.P.pdf> and <http://www.qmi.com/registration/foodsafety/GLOBALG.A.P./Default.asp?language=english>)

Organic food products' certification certifies that no chemical inputs or ingredients from genetically modified organisms have been used during the production process.

HACCP (Hazard Analysis and Critical Control Points) is a process that identifies where potential contamination can occur (the critical control points) and strictly manages and monitors these points as a way of ensuring that the process is under control and that the safest product possible is being produced. (<http://haccpalliance.org/alliance/haccp.htm>)

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