Vietnam Journal of Agricultural Sciences

ISSN 2588-1299

VJAS 2020; 3(3): 756-770
https://doi.org/10.31817/vjas.2020.3.3.09

Theoretical and Practical Issues of Research on the Consumption Needs for Safe Foods in Vietnam Using the Willingness to Pay Model

Le Thanh Ha, Nguyen Van Phuong, Do Quang Giam & Tran Quang Trung

Faculty of Accounting and Business Management, Vietnam National University of Agriculture, Hanoi 131000, Vietnam

Abstract

Research on consumer needs for safe foods under the willingness to pay (WTP) approach based on consumer behavior has been performed widely and has contributed greatly to the development of safe foods, assisted enterprises' decision-making processes in improving agricultural and food products, and provided orientation to policymakers in improving public health as well as in fostering sustainable economic growth. Some of the methods used for measuring WTP for safe foods, such as contingent value (CV), choice experiment (CE), and auction experiment (AE), have made significant contributions to the evaluation of consumers' WTP for food safety. Moreover, the application of these models has helped to estimate the effects of many factors such as demography, consumer habits, continuation of food safety, individual characteristics, promotion, and product attributes, etc., on the WTP for food safety. The trend of safe food consumption in Vietnam has distinct characteristics, some of which come from national cultural identities; therefore, Vietnamese researchers may approach the empirical studies on this issue all over the world in order to find proper methods for studying consumer needs for safe foods in Vietnam.

Keywords

Willingness to pay, safe food, consumer need

Received: June 16, 2019
Accepted: August 24, 2020

Correspondence to
lethanhha89@vnua.edu.vn

ORCID
Le Thanh Ha
https://orcid.org/0000-0001-5090-5491
Nguyen Van Phuong
https://orcid.org/0000-0003-2877-094X
Tran Quang Trung
https://orcid.org/0000-0002-8307-2397

Introduction

The process of choosing food for consumption is significantly influenced by consumer consciousness in safety and nutrients (da Fonseca & Salay, 2008). Food safety plays an important role in food consumption decisions, and shoppers have a tendency to switch to healthier diets (Radam *et al.*, 2007). Consumers have started to people's health, which can change the consumption behaviors of the buyers (Rimal *et al.*, 2001). In China, some studies have shown

that consumers are willing to pay for the attributes of products which can improve their trust in the safety of foods such as food safety certificates from the government or certificates from private organizations, labels with detailed information, and traceability systems of the products (Ortega *et al.*, 2011). In Thailand, the need for safe foods has also increased dramatically, and quality and safety requirements are emphasized in the consumption of fruits, vegetables, and meat products (Wongprawmas *et al.*, 2014). Research on consumer demands for safe foods is one of the most urgent research topics which needs to be carried out in order to develop sustainable agriculture and build appropriate marketing strategies for businesses.

Worldwide, many authors have used the willingness to pay (WTP) approach to study consumer needs for safe foods. Many previous studies have approached the assessment of the need to reduce risks in food consumption by estimating WTP (the amount of food and budget for consumption) for taxation or labeling the biosafety certificates for the food products (Travisi & Nijkamp, 2004). Safe food consumption is impacted by a variety of attributes, so the WTP price for safe foods is achieved by the WTP for these attributes (Kehagia *et al.*, 2007). Research on WTP essentially evaluates the level of consumer satisfaction of using safe foods, and from that, the producers and retailers can obtain insights into safe food consumption and can access available advantages to raise consumers' trust (Misra *et al.*, 1991). The equilibrium of the market will be achieved if the price that consumers are willing to pay for increasing the safety of food is equal to the price set by manufacturers and/or retailers, at which point manufacturers can decide to produce more (Wilcock *et al.*, 2004).

In Vietnam, although controlling food safety is a major challenge due to the complex distribution of safe foods, consumers have a tendency to choose safer and more nutritional products (Mergenthaler *et al.*, 2007). In fact, the consumer's need for safe foods has increased significantly; for example, in research on consumer willingness to pay for safe vegetables in Long Bien district, Ha Noi, Viet Nam, 65.9% of respondents had bought safe vegetables, and approximately 15-35% of them chose to consume safe vegetables daily (Do Thi My Hanh *et al.*, 2017). In another study about safe vegetable consumption in Northern Vietnam, a majority (46.25%) of 40 households chose the survey answer that they need to consume safe foods (Nguyen Van Cuong *et al.*, 2019). These results indicate a positive sign for consumer needs in research on food safety in Vietnam. However, empirical studies in Vietnam have mainly focused on safe vegetables and seafood, and little attention has been paid to other agricultural products. Hence, scientific research on consumer needs for safe foods in Vietnam is important. With the adoption of the WTP approach to assessing consumer needs for safe foods, research can be of paramount importance for businesses, retailers, and policymakers to propose policies for agricultural development in Vietnam in the future. For the reasons mentioned above, this study endeavored to review the theoretical and practical issues of research on consumer needs for safe foods in Vietnam with the willingness to pay approach concerning buyers. We aimed to provide an overview of the WTP approach in research on assessing consumer needs for safe foods and discuss methods used for measuring consumer needs for safe foods using the WTP approach.

Methodology

The article reviews various empirical journal articles about the consumption needs for safe foods and the willingness of consumers to pay for safe foods. We have also referenced some professionals' opinions related to the willingness to pay approach including methods for measuring WTP and estimation models, and some factors which affect the WTP of consumers or buyers in order to discuss the application of these methods in studies on consumption need.

Overview of the WTP Approach in Research on Assessing Consumer Needs for Safe Foods

Willingness to Pay (WTP)

Given that most of the good studies are not available in the market, the measurement of consumer needs in the market presents some difficulties. Assessing WTP is essential in studying consumer need for new products, and it is crucial to optimize the imperative price policies (Martínez-Carrasco *et al.*, 2015). Previous studies have assessed consumer WTP for products so as to set up impeccable strategies to develop and complete products based on consumer needs. Research on WTP is associated with the theory about consumers' buying decisions from problem identification, acceptance of personal responsibility, readiness for action, information searches, evaluation of alternatives, and selection of products to purchase (**Figure 1**) (Schifferstein & Ophuis, 1998). In case consumers decide to choose a product, they accept and place value on the product, which means they decide to consume that product not at market price but intuitive price (Horowitz & Mcconnell, 2003). WTP can be measured by the amount of payment or percentage of payment increment for a unit of goods or an additional attribute of that good, which can differ depending on the objectives of each research study.

Safe foods

According to the 2010 Food Safety Law of Vietnam, "food safety is the assurance that food is not harmful to life and human health" (Pham Hai Vu & Dao the Anh, 2016). Therefore, safe foods must be foods that meet respective safety standards (contain no plant protection residues, contain no pathogens, and are traceable) and have a valid certificate issued by competent authorities. In Vietnam, the issue of food safety received early attention by the Vietnamese government. In 1995, the Government of Vietnam carried out a "safe vegetable" program in response to improving food safety in Vietnam. The Ministry of Agriculture and Rural Development established the standards on the manufacturing of safe vegetables to meet the standards of the CODEX (Codex Alimentarius Commission). In that program, the Government endeavored to coordinate with local authorities to promote "safe vegetable" brands to retailers and consumers (Mergenthaler *et al.*, 2009a). Since then, the program has been raising concerns about food safety to the government and society.

In 2008, the Vietnam Technical Board of Standards (TCVN/TC/F5): Food Radiation and Sanitation Group compiled the Vietnam National Standard TCVN 5603:2008. The standard was announced by the Ministry of Science and Technology in order to replace the old Vietnam National Standard TCVN 5603:1998 which was issued in 1998. This is the current national standard of Vietnam, completely equivalent to the CODEX standard of CAC/RCP 1-1969, Rev. 4-2003. The standard sets out the general rules of practice for food hygiene, which have been recognized by the world as necessary to ensure food hygiene quality. The Vietnam National Standard TCVN 5603:2008 guides the entire food chain from the initial stages to the final consumption, and indicates how to inspect each

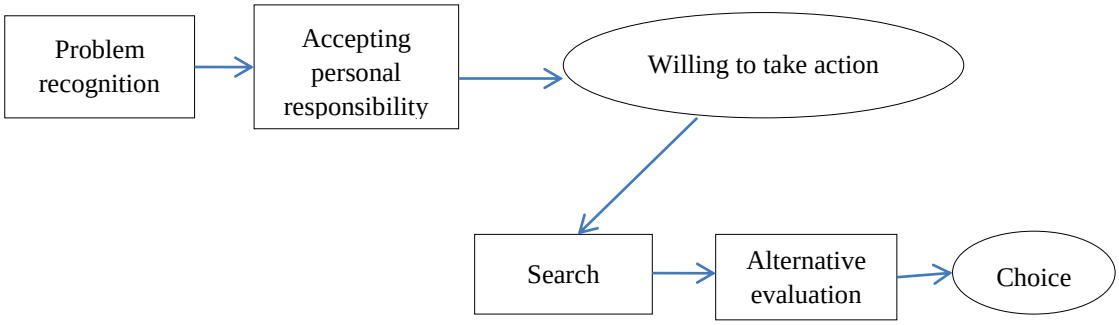

Figure 1. Model of consumer behavior theory (Schifferstein & Ophuis, 1998)

stage of the processing cycle, making recommendations on basic solutions based on HACCP (Hazard Analysis and Critical Control Points) to enhance food safety. This general principle standard is a firm foundation for ensuring food hygiene in Vietnam. On this basis, Vietnam built a separate regulatory system of sanitary practice in an appropriate manner. To control food hygiene and safety, until now, Vietnam has issued a range of national standards, which have been applied to different food groups. Safe food standards raise the final food quality, affect the internal organization of manufacturers, and orient the supply chain management. Moreover, the standards indirectly influence the competition and policies for public intervention to ensure that the food sold fulfills the designed requirements (Hammoudi *et al.*, 2009).

The management system of food safety in Vietnam is carried out from the central government to the local governments (**Figure 2**); in which, three ministries, the Ministry of Health, the Ministry of Agriculture and Rural Development, and the Ministry of Industry and Trade, are in charge of the nationwide management of food safety. In addition to the Food Safety Law issued in 2010, the Vietnam Government has issued a series of decisions and resolutions relating to food safety requirements for each group of goods like vegetables, fruits, meats, etc. The People's Committees are responsible for the local management of food safety; they are responsible for controlling the qualifications of food safety criteria in food manufactories, food retailers and food service agencies, street food sellers, local markets, and others, and for the inspection and handling of violations of food safety legislation in the managerial areas (Vietnam Congress, 2010). The food manufactories, food retailers, and foodservice agencies are responsible for the implementation of food safety qualification.

Consumption trends and consumer willingness-to-pay for safe foods

There has been an increasing tendency in the number of expenses related to safety factors in food consumption needs in Vietnam (Figuié *et al.*, 2004). Vietnam consumers have been spending 1.9% of their budget on safe foods because they trust the sellers, and 0.3% of their budget for their trust in formal certification (Mergenthaler *et al.*, 2009b). The WTP for safety

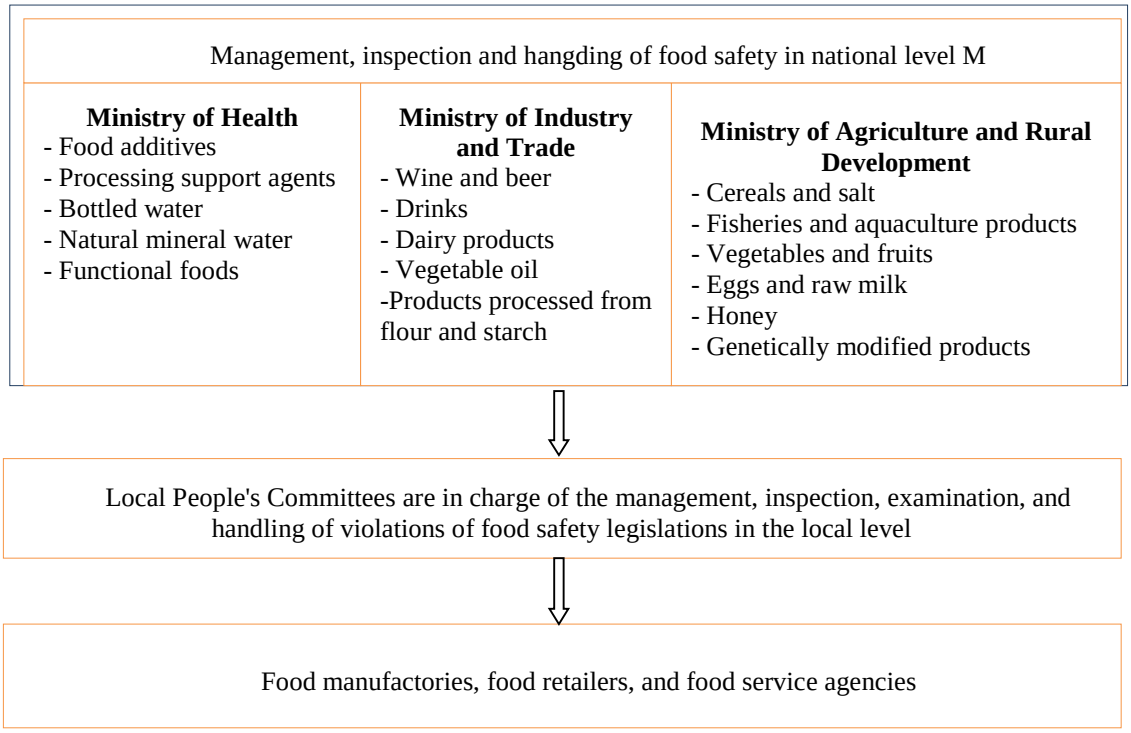

Figure 2. Management, inspection, and handling of food safety at the national level

factors in food is about 30% to 74% higher than the market prices of conventional vegetables (Mergenthaler *et al.*, 2009a; Do Thi Ha Phuong *et al.*, 2017). Given a higher comprehension of food safety certification and higher prices, consumers would be willing to pay for 1 kg of safe products compared to conventional products (My *et al.*, 2017).

In Vietnam, many barriers have appeared to limit consumers' access to safe food consumption, which can make it difficult to increase safe food production over the country. Firstly, consumer's access to safe food signage, such as brand name or government certification, is still restricted. Meanwhile, a majority of consumers still trust in food safety signs. A previous study focusing on safe food consumption in Vietnam showed that 55.5% of consumers trust in the quality of food sold at supermarkets, 49.5% of them trust the food with a reliable checkmark, and 42% of them believe in food from prestigious brands, and they are convinced by the assurance of the government and official organizations about the quality and safety of food (Vo Thi Ngoc Thuy, 2016). However, barriers to safe food consumption occur when consumers state that "*they do not do shopping in supermarkets*", "*cannot find the quality checkmark*", and "*are afraid of buying counterfeit goods*" (Figuié *et al.*, 2004). Secondly, because the price of safe foods is generally higher than their ability to pay, 68% of consumers choose to buy traditional vegetable products rather than safe vegetable products. Consequently, many retailers do not sell safe vegetables to replace conventional food (Van Hoi *et al.*, 2009).

There are a number of factors affecting safe food consumption in Vietnam, such as "food safety certificates", "clear traceability", and "supplier commitment", that may significantly impact the level of trust among Vietnamese consumers in safe food (Van Hoi *et al.*, 2009). In Vietnam markets, there are several product quality certifications such as VIETGAP (clean agricultural practices in Vietnam), GLOBALG.A.P. (global clean agricultural practices), organic (organic agricultural production), and HACCP (Hazard Analysis and Critical Control Points). However, food safety certifications (such as VIETGAP, organic, GLOBALG.A.P., and HACCP) are unfamiliar to many Vietnamese consumers. For example, in the study on Vietnamese consumers' familiarity with food quality certifications, more than 60% of 500 study respondents were not familiar with either GLOBALG.A.P. or HACCP standards, and 30% of them claimed that they had "heard" about these certificates, but they did not understand what they were (My *et al.*, 2017).

The significant differences in food consumption between rural and urban consumers is also a current trend in food consumption research in Vietnam (Hoang, 2009). The shifting into a health concerned, environmentally-friendly manner of living is the driving force for sustainable consumption of the middle-income class in urban areas (De Koning *et al.*, 2015). Urban consumers are also more likely to understand safe food and food safety certifications (Figuié *et al.*, 2004). Safety consumption trends are also being formed among urban consumers. For sustainable consumption purposes, consumers are willing to eat more organic food, less meat, and more local foods, and they prepare food with less waste and minimized food storage in the fridge (De Koning *et al.*, 2015).

The above issues are important considerations for the selection of proper research methods as well as appropriate models for assessing safe food consumption needs in Vietnam. Different contexts and circumstances require different methods and approaches; therefore, researchers should select a suitable method and model in accordance with their particular purposes.

Methods used for Measuring Consumer Needs for Safe Foods Using the WTP Approach

Methods for measuring WTP

There are five standard methods for measuring WTP, which are the contingent value

method (CV), choice experiment method (CE), auction experiment method (AE), menu-based choice experience method (MBC), and conjoint analysis method (CA*)*. All of the above five methods have been considered for the research of food consumption in Vietnam.

CV method

The CV method generally uses non-market valuation to access WTP such as questionnaires for consumers. This method has been widely used in empirical research on consumer behavior or consumption need to estimate WTP, but since there is no market for safe foods, the direct observations for monetary amounts that people pay for safe foods cannot be obtained (Bozoglu *et al.*, 2019). Instead of a survey for consumption habits, this method allows researchers to directly ask consumers through survey questions about their buying options: whether they would buy a product or not, and at what price and quantity (Carson *& et al.*, 2001). The CV method is commonly used in food studies, especially in measuring WTP for safe foods (Radam *et al.*, 2007). The results of survey questions can be used to implicate a direct economic interpretation if the good to be valued is clearly explained, its delivery to consumers is conceivable, and a realistic expectation of payment was identified (Carson *et al.*, 2001). In CV, the WTP for a single well-defined product is identified by asking respondents to place an acceptable value on that product (Mørkbak *et al.*, 2011). The study by Haghjou *et al.* (2013) made an effort to evaluate the factors affecting the need for safe products by the CV method. Their research conducted a trial survey on 50 people before an official survey on 423 consumers. Haghjou *et al.* assessed consumers' willingness to pay on a 6-point scale (6-point Likert Scale): not willing to pay, willing to pay less than 5% higher than traditional product's price, willing to pay 5-14% higher than traditional product's price, willing to pay 15-24% higher than traditional product's price, willing to pay 25-34% higher than traditional product's price, and willing to pay 35% higher than traditional product's price. Their study examined the explanatory variables for the willingness to pay decisions, including demographics, behavior, shopping habits, knowledge about safe products, and level of risk tolerance, etc. WTP can also be evaluated using the CV method by the dichotomy method, in which the questions for the interviewees require the respondents to answer whether they are willing to an additional amount of B_1 for a safe food. The respondents can answer yes/no, and if yes, the respondents continue to answer questions of whether they are willing to pay a higher price for the safe food (B_2) with the answer to this question being yes or no (with the conditional restriction $B_2 > B_1$, and B_1, B_2,.., B_n being the value range of money respondents are willing to pay for safe products) (Travisi & Nijkamp, 2004).

CE method

In addition to the CV method, the CE method was developed to estimate WTP for safe foods as a broader approach of CV for food consumption. CE respondents are asked to choose between a number of a set of product characteristics. Then the WTP of individual characteristics can be evaluated (Mørkbak et al., 2011). Because safe food gives credibility to some characteristics which differ from conventional ones, the CE method is based on the assumption that consumers choose to buy safe foods by comparing not only observable characteristics but also unobservable characteristics. Consumer WTP is an aggregation of WTP for product attributes. Therefore, in the survey, consumers are asked to choose among a number of products which are associated with specific characteristics (each particular characteristics is one product attribute) such as safety, traceability, and certificates, etc. (Gracia & De Magistris, 2008; Wongprawmas et al., 2014). Consumption decisions are made based on the degree of utility gained from a series of consumption options, and each option displays some product characteristics in an attempt to keep a balance of the product characteristics in order to optimize utility. To minimize the bias in measuring WTP, the role of cheap talk was mentioned. Cheap talk can remind participants of some realistic issues which can limit their options. The cheap talk can warn consumers not to exceed their actual WTP threshold in terms of income constraints, consumer budgets, and product knowledge, etc.

(Van Loo *et al.*, 2011). Attributes to safe food consumption can include the following components: price, freshness, brand name, traceability, government food safety certificates, and certificates of other organizations (Ortega *et al.*, 2011; Van Loo *et al.*, 2011; Wongprawmas *et al.*, 2014). The main criticism of CE is that there are numerous choice sets. A WTP questionnaire with a yes/no option for all possible combinations for five different characteristics will create a questionnaire with $(2^5)^2$ options or 1024 choice sets, which is not feasible when conducting a survey. Thus, fractional factorial design (**Table 1**) is often used to deal with this problem (Ortega *et al.*, 2011). The fractional factorial model is designed to offer some options with particular combinations of product characteristics and then asks participants their favorite choice options.

AE method

The AE method is rarely used, usually due to limitations on the cost and time of research, scope of the study area, and sampling. Therefore, although this method is costly, the results are not representative of the whole population (Martínez-Carrasco *et al.*, 2015). AE uses empirical supermarkets and allows consumers to choose products at the same price as they do in actual shopping. The change in the information listed about the safety of the products corresponding of the risk of product consumption is conducted in parallel with the change in price, and then the willingness-to-pay is the average price of the results from the trial. Hayes *et al.* (1995) applied this method to evaluate WTP for safe foods (sandwich products with safe and quality ingredients). The research revealed that customers were willing to pay $0.70 more for safer products. Fox *et al.* (1995) designed experiences to apply the AE method to estimate WTP in which participants were given the options of consuming ordinary food without payment or bidding to consume food with additional safety ingredients. The screening process to select individuals participating in the experiments affected the estimated WTP value. According to Fox *et al.* (1995), if there is a failure in creating a strict set of criteria for selecting participants, the estimated WTP value may be higher than the real WTP value for safe products (Martínez-Carrasco *et al.*, 2015).

Menu-based choice experience method

This method was applied in some research about the WTP for the attribution of food products. By setting menus for the shopping experience, the study collected the alternative choices of participants. Based on a MBC experience auction, the corresponding reactions of consumers when product attributions change are captured (Hou *et al.*, 2020a). Generally, MBC is a complicated procedure and expensive to use (Hou *et al.*, 2020b).

Conjoint analysis method

CA provides numerous sets of products with particular characteristics. Each combination is known as a product profile, and then consumers give a score to evaluate the level of preference related to each combination of product characteristics (Hou *et al.*, 2020b). The issue that occurs in this method is to reduce the number of attributes of the products in order to manage the number of combinations (Green & Srinivasan, 1978). Due to the profiles including sets of

Table 1. WTP questionnaire for safe food attributes

	Option 1	Option 2	Option 3
Price ($)	12	8	Not buy, not accept product
Traceability systems	Yes	No	
Government certificate	Yes	Yes	
Certificate of private organization	Yes	No	
Label	No	No	
I will buy (stick in O)	O	O	

Source: Ortega (2011)

attributes of each product, we can derive discrete measures of WTP for each attribute. The most suitable number of attributes should not exceeded 6 because at that point, the sample size is still small, and the questionnaire can be designed so that respondents pay attention to the answers (Hou *et al.*, 2020b). To get the effective WTP measurements, CA and CE or AE have been used by corporations to better understand consumer preferences for food characteristics (Darby *et al.*, 2008; Imami *et al.*, 2016).

WTP estimation models

Recent empirical research on WTP used different models for the estimation of WTP such as the discriminant analysis, logistics regression, combined model and filter design, and Heckman two-step models.

Discriminant analysis model

Some effective models of discriminant analysis methods can be listed as radar diagrams, descriptive statistics, and non-parametric tests. Discriminant analysis is related to classifying respondents into different groups. For example, respondents of a sample could be divided into three groups depending on consumption behaviors with regard to alternatively grown foods and reform foods. Respondents who can buy both alternatively grown food and reform foods would be referred to the first group, respondents who cannot buy organic foods but do buy reform foods would be referred to the second group, and respondents who cannot buy either of the two food types would be referred to the third group (Schifferstein & Ophuis, 1998). Radar diagrams can depict the purchase behaviors between some classified characteristics of respondents: concern for their own health, concern for environment protection, knowledge of organic food, etc. Then, the decisive factors influencing consumer purchase decisions can be determined (Yin *et al.*, 2010). Descriptive statistics and non-parametric tests can be used to determine the statistical significance of the explanatory variables to attitudes and behaviors toward safe food. The non-parametric test enables users to analyze all of the cases for the purpose of comparing of two independent samples (e.g. female/male and buyer/non-buyer) in terms of attitudes towards the safe foods (Sangkumchaliang & Huang, 2012). Although it is suitable for a simple analysis of WTP, it is hard to estimate appropriate WTP results through this method because this method is primarily focused on evaluating the differences of WTP between some groups of consumers. Otherwise, discriminant analysis cannot achieve the optimal results unless participants were provided the definition of each safe food without attempting to educate or influence their purchase decision. This means there is a requirement that questionnaires need to be carefully designed to avoid influencing consumer responses in respect of minimizing the bias of information reflected in the consumer's behaviors (Rimal *et al.*, 2001).

Logistics regression model

Some studies have assessed customer behaviors in purchasing safe foods and the factors affecting those decisions based on discrete choice theory. When studying WTP, the variable Y denotes the choice of WTP, which shows the consumers' WTP choices being either 0 (no WTP) or 1 (yes WTP). Data collected in a survey are converted to binary variables for the assumed results of 0 and 1, and the probability of distribution for each variable of 0 and 1 is the Bernoulli distribution, in which P (Y = 1) = π, probability P (Y = 0) = 1-π, and π in the range (0,1) is the probability of choosing to consume the product. The purpose of WTP estimation is to assess the impact of each variable on WTP. The simplest case following a linear regression model is $E(Y \mid x) = \pi = \beta + \beta_1 x$. The introduction of binary and dummy variables in the study of consumer behavior has given rise to limitations in the application of linear regression in quantitative analysis. First, estimating by linear regression can give results of estimating the probability of consumer choice which exceed the range (0,1). Second, the correlation between the independent variables and the probability of choosing the product is not a linear correlation. These two issues are appropriately addressed by logistic regression (Fitzmaurice & Laird, 2015). The simple logistic regression model is as

follows: g (π) = β_0 + β_1x, and the multivariate logistic regression model has the form: g (π) = β_0 + β_1x_1 + β_2x_2 + β_3x_3 + ... + β_nx_n, in which, π is the probability that consumers choose between (0,1), while x_1 ... x_n are the independent variables affecting the probability of choosing to consume the product. The different models of logistic regression are as follows:

Logistic (logit) function: $g(\pi) = \log[\frac{\pi}{1-\pi}]$

Probit function $g(\pi) = \Phi^{-1}(\pi)$ in which Φ is the Gaussian normal distribution function

Log-log function: $g(\pi) = \log[-\log(1-\pi)$

The logistic regression method mentioned above is the simplest form. Furthermore, some recent researchers studying consumer willingness to pay have used random parameters logit (RPL) and multinominal logit (MNL). The traditional conditional logit model (often referred to as the MNL model) was proposed by Mcfadden (1973) and is widely used to estimate WTP, then it was upgraded to the mixed multinomial logit model (MMNL), which can be called the random coefficients logit (RCL) model. This upgrade improved the model's ability to deal with more complex error component structures. In the model, WTP cannot be estimated as a fixed value but is represented by a random distribution of WTP (Balogh *et al.*, 2016). WTP can also be estimated with RPL, which limits three disadvantages of MNL by allowing random taste variation and alternative percept patterns, and correcting unobserved factors (Alfnes *et al.*, 2006). Furthermore, since the WTP for the food attributes contributes to the consumer's WTP for a food, a model that can estimate WTP for each attribute's contribution is necessary (Hou *et al.*, 2020a). In empirical research, MVP was used to access the WTP for multiple choices of substitute attributes. The MVP model is characterized by a set of dependent variables and each equation was considered to use the fixed set of independent variables (Ngenoh *et al.*, 2019). Generally, the logistic regression model produces the higher significant estimation for WTP in case of binary and dummy variables used in models compared to the linear regression model. However, this method cannot incorporate factors analysis to deal with a series of interrelated relationships among the numerous of factors.

Combined models and filter design model

Some research approached WTP by combining the models based on filter design to minimize deviations in analyzing survey data. Obviously, the analysis of survey data based on filter design can be performed by a probit estimation model for binary variables. The filter design was studied in estimating WTP with the assumption that consumers make two decisions: (1) whether they are willing to pay or not; and (2) how much they are willing to pay (Huang *et al.*, 1999). According to behavior and decision-making processing theory, consumers will decide to buy safe food, and if they choose to buy, then consumers will decide to buy at what price, or decide how much to pay for safe products. So, the filter structure consists of two dependent variables d (d = 1 if they are willing to pay and d = 0 if they are not willing to pay), and the variable y_j (y_j = 1 if y_j-1 * <y * <y_j *; y_i = 0), in which (y_j-1, y_j) is the price range. The equation has the following form:

$d = \alpha X + \varepsilon_d$ and $y_j = \beta Z + \varepsilon_y$; of which, ε_d, ε_y are constants, and X, Z are the sets of explanatory variables

The probability function is as follows:

Probability of events d =0: $P(d=0) = \int_{\alpha X}^{\infty}\int_{\beta Z}^{\infty} f(e_d, e_y, \theta) = F(-\alpha X, \infty, \theta)$

$F(-\alpha X, \infty, \theta)$ is the cumulative distribution of $f(e_d, e_y, \theta)$

Probability of events d=1: $P(d=1) = \int_{-\infty}^{\infty}\int_{m_{j-1}-\beta Z}^{m_j-\beta Z} f(e_d, e_y, \theta)\, d\varepsilon_d d\varepsilon_y = F(\alpha X, m_j-\beta Z, \theta) - F(\alpha X, m_{j-1}-\beta Z, \theta)$, of which m_0, m_1, …m_n are the list of options of the WTP variables and j accepts the value from 0 to n.

The model makes estimates by the method of maximum likelihood. Thus, the likelihood function for the proposed models is as follows:

$L = \prod_{i=1}^{N}\prod_{j=1}^{N} P(d_i = 0)^{1-d_i} P(d_i = 1, y_{ij})^{d_i y_{ij}}$, of which i is the index of individual observations, N is the size of the sample, and α, β, θ are the parameter estimations.

The study of Huang (1996) was one of the pioneering studies when analyzing safe food consumption needs through two aspects of consumer behavior: liking products and accepting purchases. His research has built two models to evaluate the factors that influence consumers' preference for safe products and the factors that influence consumer acceptance of the safe product. The results showed that consumers are interested in safe products, are interested in limiting pesticides, and understand the importance of quality control, nutritional ingredients, and product price that affect their preference for safe food. However, the acceptance of consumption depends on the level of education, family size, income, product prices, product appearance, age, and income. However, this research still has a limitation in answering "*how much consumers can consume for the product they choose*." Heckman (1976) introduced a two-stage regression estimation model, which was first designed for cases where consumption can be zero (Bozoglu *et al.*, 2019), so the process of consumer needs research will be divided into two steps: (i) Step 1: identify whether consumers are willing to buy the product; and (ii) Step 2: if they are willing to buy, how much are they buying? Asatryan (2004) applied this model to study pork consumer needs by assessing the influences of factors on safe food purchase decisions (crop, diet as suggested by doctors, gender, age, educational level, area of residence, number of family members, and families without members under 18) and factors influencing the amount of food purchased (crop, doctor's diet recommendations, gender, age, region of residence, and number of family members).

When studying food products, it can be seen that the distinct characteristics of a product create the differences among similar products and safe foods have their own specific characteristics which differ from traditional products. For this reason, customers are willing to pay for these differences, which include both observable differences and unobservable differences (Gracia & De Magistris, 2008). In such a case, it can be assumed that consumers buy a product's characteristics instead of the product itself, and then the Lancaster consumer needs model can be highly evaluated to analyze the WTP for safe foods (Gracia & De Magistris, 2008). In the Lancaster model, consumers select products as a process of combining complementary characteristics, which can be known as the attributes of products, to maximize usability. In particular, the utility is measured by the following function: $U_{ij} = U_{ij} (z_1, z_2... z_n)$ where $z_i = a_i p_i$ is the consumption attributed to characteristic i, in which one is the consumption volume and p_i is the price of the product consumed. The utility function is related to two groups of impact factors, the observable group such as the characteristics of the product, and the unobservable group such as customer preferences. The unobservable part is often difficult to measure, so it is possible to write the utility function of a safe food as follows: $U_{io} = \beta_{io} z_i + \varepsilon_{io}$, where ε represents the effect of the unobservable part. The utility function of a conventional food can be written as Uic = βic zi + εic; in which, β_{io} and β_{ic} are the estimated parameters. Then, the probability of the WTP for safe foods will be $P(Y_o) = P(U_{io} > U_{ic}) = P(\varepsilon_{io} - \varepsilon_{ic} < \beta_{io} z_o - \beta_{ic} z_o)$, assuming the following definition: $\varepsilon_i = \varepsilon_{io} - \varepsilon_{ic}$, $\beta_i = \beta_{io} z_o - \beta_{ic} z_o$. In addition, to explain why consumers choose safe foods, the bivariate choice model is used as follows: $y^*_i = \beta_i z_i + \varepsilon_i$, of which: y* is the unobservable variable which represents the probability of a safe food consumption option, z_i is the explanatory variable of the purchase decision, and y is the observable variable, which is in relationship with y* and can accept the values 0 and 1, if y=1: $y^*_i \geq 0$ or $\varepsilon_i \geq - \beta_i z_i$; $U_{io} > U_{ic}$. Then, the probability of the consumption frequency can be written as follows: $x^*_i = \alpha_i di + \lambda_i$, of which: x* is the unobservable variable, which represents the probability of the safe food consumption frequency, d_i is the explanatory variable of the option of the safe food consumption frequency, x_i is the observable variable in the relationship with x*, $y_i = 1$, where x = 0 if the consumer is a not regular safe food consumer, and x =1 if the consumer is a regular safe food consumer, and ε_i and λ_i are also accepted in N(0,1).

Generally, the combined models and filter design increase the significance of WTP of

consumption need for safe food since the model adds the selectivity of the sample into its databases. Filter design can correct for zero consumption cases and limits model bias generating from sample selection by dropping observations (Lanfranchi *et al.*, 2019). However, one disadvantage of this method is that numerous variables selected into the model can make a multidimensional problem, which is caused by some variables being interconnected with others.

Previous studies have shown that the factors that explain WTP for safe foods can be grouped into: factors related to food safety awareness, health awareness, and human factors, anthropology, individual characteristics, media and promotion factors, and product contribution factors (Capps & Park, 2002; Michaelidou & Hassan, 2010; Liu *et al.*, 2013) (**Figure 3**). WTP research is derived from identifying whether customers prefer safe foods; if they prefer them, whether they will accept the consumption of the safe foods; and if they accept consumption, how much money are they willing to pay or the amount they are willing to pay for the safe foods. The studies can set the price range for the WTP and the amount of the product that consumers are willing to buy in order to design appropriate questions. Accordingly, many variables are included in the models to assess the factors explaining WTP for safe foods (**Table 2**). Variables can be selected such as age, gender, education level, knowledge of safe foods, health concerns, environmental concerns, product prices, product quality, taste, and color, etc. Depending on the characteristics of each type of safe food and geographic region, cultural factors, and general consumer trends, etc., the proper models are selected and applied appropriately. Two methods which can be used to screen variables are EFA (exploration factors analysis) and SEM (structural equation modeling). EFA is a multivariate statistical method designed to find potential variables from observed variables, based on the assumption that the observed and measurable variables can be captured and laid into latent variables. The number of samples considered for this method is about 300 observations (Yong & Pearce, 2013; Janssen, 2018). SEM is a model used to verify the suitability of a linear model of the explanatory variables of WTP, and this model is used when analyzing the interrelationships of the

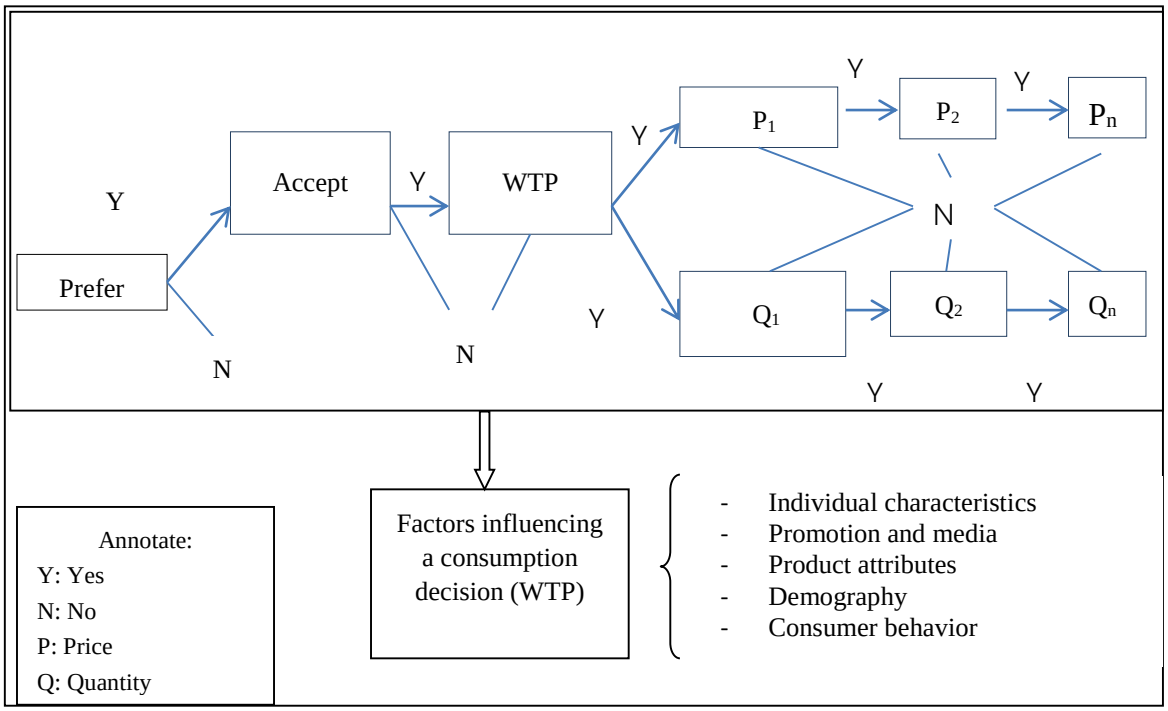

Figure 3. Model of assessing a factor's influence on WTP

explanatory variables of WTP. The model can be seen as an extension of the multiple regression method. The technique allows the estimation of a range of regression models, in which the function is discrete but interdependent, with the ability to contain a series of interdependent relationships (layers). This technique may incorporate factor analysis to explain the model structure or hidden, unobservable factors, and then examine the model structure. This technique is performed before the statistical analyses are conducted, so it is often used to test the model's suitability (Michaelidou & Hassan, 2010).

Conclusions

The paper attempts to review the theoretical and practical issues about the consumption and needs for safe foods in Vietnam through the willingness to pay of concerned consumers.

Table 2. Review of the explanatory variables of WTP for safe foods in empirical research

Groups	Explanatory	References
Individual characteristics	Age	Thompson & Kidwell, 1998; Huang *et al.*, 1999; Radam *et al.*, 2007; Gracia & De Magistris, 2008; Yin *et al.*, 2010; Mørkbak *et al.*, 2011; Ngo Minh Hai & Vu Quynh Hoa, 2016; Do Thi My Hanh *et al.*, 2017; My *et al.*, 2017
	Sex	Huang *et al.*, 1999; Asatryan, 2004; Mørkbak *et al.*, 2011; Haghjou *et al.*, 2013; My *et al.*, 2017
	Education situation	Thompson & Kidwell, 1998; Huang *et al.*, 1999; Asatryan, 2004; Gracia & De Magistris, 2008; Haghjou *et al.*, 2013; Ngo Minh Hai & Vu Quynh Hoa, 2016; My *et al.*, 2017; Wang *et al.*, 2018
Promotion and media	Promotion	Rimal *et al.*, 2001; Van Loo *et al.*, 2011; Haghjou *et al.*, 2013
	Price	Rimal *et al.*, 2001; Radam *et al.*, 2007; Ortega *et al.*, 2011; Janssen, 2018
	Certificates	Ortega *et al.*, 2011; Ngo Minh Hai & Vu Quynh Hoa, 2016
Product contributions	Health situation	Gracia & De Magistris, 2008; Yin *et al.*, 2010
	Quality	Gracia & De Magistris, 2008; Yin *et al.*, 2010; Ngo Minh Hai & Vu Quynh Hoa, 2016
	Environmentally friendly	Gracia & De Magistris, 2008; Ortega *et al.*, 2011
	Taste	Yin *et al.*, 2010; Ortega *et al.*, 2011
	Color	Yin *et al.*, 2010; Janssen, 2018
	Convenience	Yin *et al.*, 2010; Janssen, 2018
Demography factors	Marriage situation	Haghjou *et al.*, 2013
	Size of family	Huang, 1996; Radam *et al.*, 2007
	Income	Huang, 1996; Huang *et al.*, 1999; Radam *et al.*, 2007; Gracia & De Magistris, 2008; Yin *et al.*, 2010; Nguyen Minh Duc & Dang Thanh Liem, 2015; Do Thi My Hanh *et al.*, 2017; My *et al.*, 2017; Wang *et al.*, 2018
	Children family members	Thompson & Kidwell, 1998; Huang *et al.*, 1999; Radam *et al.*, 2007; Yin *et al.*, 2010
Consumer behaviors	Diseases	Huang *et al.*, 1999
	Trust and comprehension of safe foods	Yin *et al.*, 2010; Ngo Minh Hai & Vu Quynh Hoa, 2016; Prakash *et al.*, 2018
	Concern about environmental protection	Haghjou *et al.*, 2013; Le Thi Phuong Dung & Nguyen Huu Dat, 2016; My *et al.*, 2017; Janssen, 2018; Prakash *et al.*, 2018
	Awareness of health	Huang, 1996; Rimal *et al.*, 2001; Janssen, 2018; Prakash *et al.*, 2018
	Awareness of safety	Le Thi Phuong Dung *et al.*, 2016; My *et al.*, 2017; Nguyen Thi Thu Quynh *et al.*, 2018
	Concern about testing	Huang, 1996; Xu & Wu, 2010
	Concern about nutritional values	Huang, 1996

Research on safe food consumption needs using the WTP approach is consistent with current consumption trends and in line with the national agricultural development strategy orientation. The results of the empirical studies mentioned above have contributed greatly to decision making of enterprises, agricultural development policies, and public health. The WTP estimation methods implemented such as CV, CE, and AE have made significant contributions to the assessment process of the WTP for safe foods. In addition, the application of analytical models, such as the discriminant analysis, logistics regression model, and combined models, have helped to evaluate the influences of explanatory factors of WTP for safe foods such as consumer behaviors, health awareness, demography factors, individual characteristics, media and promotion factors, and product contribution factors.

Many previous studies have explained the effects of a variety of explanatory variables of consumers' WTP for safe foods such as age, gender, income, and health concerns, etc. through the different WTP models. They are important references for Vietnam's safe food consumption assessment. Nevertheless, there are various factors affecting consumption trends for safe foods in Vietnam which are country-specific. Depending on the particular context to achieve the most meaningful findings, it is proposed to follow three steps when calculating the WTP for safe foods which are: (1) choose the appropriate WTP measurement; (2) perform evaluation methods to estimate WTP; and (3) establish the model of explanatory variables of WTP for safe foods.

Acknowledgments

We would like to express our very great appreciation to the Faculty of Accounting and Business Management, Vietnam National University of Agriculture for their help in offering us the resources in running our analyses.

References

Alfnes F., Guttormsen A. G., Steine G. & Kolstad K. (2006). Consumers' Willingness to Pay for the Color of Salmon: A Choice Experiment with Real Economic Incentives. American Journal of Agricultural Economics. 88(4): 1050-1061.

Asatryan A. A. (2004). Data mining of market information to assess at-home pork demand, Doctor of philosophy, Texas A&M University, 245 pages.

Balogh P., Békési D., Gorton M., Popp J. & Lengyel P. (2016). Consumer willingness to pay for traditional food products. Food Policy. 61: 176-184.

Bozoglu M., Bilgic A., Huang C. L., Florkowski W. J. & Topuz B. K. (2019). Urban households' willingness to pay for milk safety in Samsun and Trabzon provinces of Turkey. British Food Journal. 121(10): 2379-2395.

Capps O. & Park J. (2002). Impacts of advertising, attitudes, lifestyles, and health on the demand for US pork: A micro-level analysis. Journal of Agricultural and Applied Economics. 34(1): 1-15.

Carson R. T., Flores N. E. & Meade N. F. (2001). Contingent Valuation: Controversies and Evidence. Environmental and Resource Economics. 19(2): 173-210.

da Fonseca M. d. C. P. & Salay E. (2008). Beef, chicken and pork consumption and consumer safety and nutritional concerns in the City of Campinas, Brazil. Food Control. 19(11): 1051-1058.

Darby K., Batte M. T., Ernst S. & Roe B. (2008). Decomposing Local: A Conjoint Analysis of Locally Produced Foods. American Journal of Agricultural Economics. 90(2): 476-486.

De Koning J. I. J. C., Crul M. R. M., Wever R. & Brezet J. C. (2015). Sustainable consumption in Vietnam: an explorative study among the urban middle class. International Journal of Consumer Studies. 39(6): 608-618.

Do Thi Ha Phuong, Doan Thi Mai, Chu Thi Ha & Nguyen Thi Giang (2017). Factors affecting the willingness of consumers to pay for safe food in Thai Nguyen and Thai Nguyen cities. Journal of Science and Technology - Thai Nguyen University. 170(10): 59-64.

Do Thi My Hanh, Do Thi tuyet Mai, Tran Trong Nam & Nguyen Trong Tuynh (2017). Factors affecting consumers' willingness to pay for safe vegetable products: Case study in Gia Lam and Long Bien districts. Vietnam Journal of Agricultural Sciences. 13(4): 841-849.

Figuié M., Bricas N., Thanh V. P. N., Truyen N. D. & de l'Alimentation E. S.-E. (2004). Hanoi consumers' point of view regarding food safety risks: an approach in terms of social representation. Vietnam Social Sciences. 3(101): 63-72.

Fitzmaurice G. M. & Laird N. M. (2015). Binary Response Models and Logistic Regression. International Encyclopedia of the Social and Behavioral Sciences. 2: 587-595.

Fox J. A., Shogren J. F., Hayes D. J. & Kliebenstein J. B. (1995). Experimental auctions to measure willingness

to pay for food safety. In: Caswell, J. A. (Ed.). Valuing food safety and nutrition. Food Marketing Policy Center, Department of Agricultural and Resource Economics, University of Connecticut: 128 pages.

Gracia A. & De Magistris T. (2008). The demand for organic foods in the South of Italy: A discrete choice model. Food Policy. 33(5): 386-396.

Green P. E. & Srinivasan V. (1978). Conjoint analysis in consumer research: issues and outlook. Journal of consumer research. 5(2): 103-123.

Haghjou M., Hayati B., Pishbahar E., Mohammad R. R. & Dashti G. (2013). Factors affecting consumers'potential willingness to pay for organic food productions in Iran: case study of tabriz. Journal of Agricultural Science and Technology. 15: 191-202.

Hammoudi A., Hoffmann R. & Surry Y. (2009). Food safety standards and agri-food supply chains: an introductory overview. European Review of Agricultural Economics. 36(4): 469-478.

Hayes D. J., Shogren J. F., Shin S. Y. & Kliebenstein J. B. (1995). Valuing food safety in experimental auction markets. American Journal of Agricultural Economics. 77(1): 40-53.

Heckman J. J. (1976). The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator for such models. In: Annals of economic and social measurement. NBER: 475-492.

Hoang L. V. (2009). Estimation of food demand from household survey data in Vietnam.Working Papers from Development and Policies Research Center (DEPOCEN), Vietnam. 2.

Horowitz J. K. & McConnell K. E. (2003). Willingness to accept, willingness to pay and the income effect. Journal of Economic Behavior & Organization. 51(4): 537-545.

Hou B., Hou J. & Wu L. (2020a). Consumer preferences for traceable food with different functions of safety information attributes: Evidence from a menu-based choice experiment in China. International Journal of Environmental Research and Public Health. 17(1): 146.

Hou B., Wu L. & Chen X. (2020b). Market simulation of traceable food in China based on conjoint-value analysis: a traceable case of pork. International Food and Agribusiness Management Review. Special issue: New subtainable food and agribusiness manangement model: 1-12. DOI: 10.22434/ifamr2019.0122.

Huang C. L. (1996). Consumer preferences and attitudes towards organically grown produce. European Review of Agricultural Economics. 23(3): 331-342.

Huang C. L., Kan K. & Fu T. T. (1999). Consumer willingness to pay for food safety in Taiwan: A binary ordinal probit model of analysis. Journal of Consumer Affairs. 33(1): 76-91.

Imami D., Skreli E., Zhllima E., Canavari M., Chan C. & Cela A. (2016). Analysis of consumers' preferences for typical local cheese in Albania applying conjoint analysis. New Medit. 15(3): 49-55.

Janssen M. (2018). Determinants of organic food purchases: Evidence from household panel data. Food quality and preference. 68: 19-28.

Kehagia O., Linardakis M. & Chryssochoidis G. (2007). Beef traceability: are Greek consumers willing to pay? EuroMed Journal of Business. 2(2): 173-190.

Lanfranchi M., Schimmenti E., Campolo M. G. & Giannetto C. (2019). The willingness to pay of Sicilian consumers for a wine obtained with sustainable production method: An estimate through an ordered probit sample-selection model. Wine Economics and Policy. 8(2): 203-215.

Le Thi Phuong Dung & Nguyen Huu Dat (2016). Willingness to pay for water quality improvement in handicraft of Bacninh province, Vietnam. Vietnam Journal of Agricultural Sciences. 14(10): 1608-1617.

Le Thi Phuong Dung, Nguyen Huu Dat & Nguyen Thi Huong Giang (2016). Willingness to Pay for Remediation of Water Environmentin Wooden Craff Village of Dong Ky, Bac Ninh. Vietnam Journal of Agricultural Sciences. 14(2): 274-280.

Liu R., Pieniak Z. & Verbeke W. (2013). Consumers' attitudes and behaviour towards safe food in China: A review. Food Control. 33(1): 93-104.

Martínez-Carrasco L., Brugarolas M., Martínez-Poveda A. & Ruiz-Martínez J. J. (2015). Comparing hypothetical versus non-hypothetical methods for measuring willingness to pay in a food context. Spanish Journal of Agricultural Research. 13(4-e0109): 1-12.

McFadden D. (1973). Conditional logit analysis of qualitative choice behavior. In., University of Califorina at Berkeley: 105-142.

Mergenthaler M., Qaim M. & Weinberger K. (2007). Changing Consumer Buying Habits in Developing Countries: A Disaggregate Demand Analysis for Fruits and Vegetables in Vietnam.

Mergenthaler M., Weinberger K. & Qaim M. (2009a). Consumer valuation of food quality and food safety attributes in Vietnam. Review of Agricultural Economics. 31(2): 266-283.

Mergenthaler M., Weinberger K. & Qaim M. (2009b). The food system transformation in developing countries: A disaggregate demand analysis for fruits and vegetables in Vietnam. Food Policy. 34(5): 426-436.

Michaelidou N. & Hassan L. M. (2010). Modeling the factors affecting rural consumers' purchase of organic and free-range produce: A case study of consumers' from the Island of Arran in Scotland, UK. Food Policy. 35(2): 130-139.

Misra S. K., Huang C. L. & Ott S. L. (1991). Consumer willingness to pay for pesticide-free fresh produce. Western Journal of Agricultural Economics. 218-227.

Mørkbak M. R., Christensen T. & Gyrd-Hansen D. (2011). Consumers' willingness to pay for safer meat depends on the risk reduction methods – A Danish case study

on Salmonella risk in minced pork. Food Control. 22(3-4): 445-451.

My N. H. D., Rutsaert P., Van Loo E. J. & Verbeke W. (2017). Consumers' familiarity with and attitudes towards food quality certifications for rice and vegetables in Vietnam. Food Control. 82: 74-82.

Ngenoh E., Kurgat B. K., Bett H. K., Kebede S. W. & Bokelmann W. (2019). Determinants of the competitiveness of smallholder African indigenous vegetable farmers in high-value agro-food chains in Kenya: A multivariate probit regression analysis. Agricultural and Food Economics. 7(1): 3-12. DOI: 10.1186/s40100-019-0122-z.

Ngo Minh Hai & Vu Quynh Hoa (2016). Consumer perception of organic food: a case study in Hanoi city. Vietnam Journal of Agricultural Sciences. 14(9): 1466-1474.

Nguyen Minh Duc & Dang Thanh Liem (2015). Preference and attitude of consumers in HCMC for processed aquatic products. Journal of scientific research. 9: 14-23. (in Vietnamese).

Nguyen Thi Thu Quynh, Nguyen Tat Thang & Bui Thi Khanh Hoa (2018). Awareness and Willingness-to-Pay for Clean Water Servicein Thuy Nguyen District, Hai Phong City. Vietnam Journal of Agricultural Sciences. 16(8): 763-772.

Nguyen Van Cuong, Tran Dong Lap & Pham Thi Minh Tam (2019). Economic analysis of safe vegetable production and measurement of willingness to pay. Applying technology - connecting value chains, reducing risks for agricultural products. Forum of Mekong connect 2019. 89-101.

Ortega D. L., Wang H. H., Wu L. & Olynk N. J. (2011). Modeling heterogeneity in consumer preferences for select food safety attributes in China. Food Policy. 36(2): 318-324.

Pham Hai Vu & Dao The Anh (2016). Agricultural food safety: Some knowledge about products, distribution systems and government policies. Agricultural publisher. 6-10..

Prakash G., Singh P. K. & Yadav R. (2018). Application of consumer style inventory (CSI) to predict young Indian consumer's intention to purchase organic food products. Food quality and preference. 68: 90-97.

Radam A., Cher L. Y., Shamsudin M. N., Mohamed Z. & Selamat J. (2007). Consumers' willingness to pay towards food safety: The case of meat consumption. Economic and Technology Management Review. 2: 63-74.

Rimal A., Fletcher S. M., McWatters K. H., Misra S. K. & Deodhar S. (2001). Perception of food safety and changes in food consumption habits: a consumer analysis. International Journal of Consumer Studies. 25(1): 43-52.

Sangkumchaliang P. & Huang W.-C. (2012). Thai Organic Food Demographics, Attitudes and Behavior. International Journal of the Computer, the Internet and Management. 20(3): 7-11.

Schifferstein H. N. J. & Ophuis P. A. M. O. (1998). Health-related determinants of organic food consumption in the Netherlands. Food quality and preference. 9(3): 119-133.

Thompson G. D. & Kidwell J. (1998). Explaining the choice of organic produce: cosmetic defects, prices, and consumer preferences. American Journal of Agricultural Economics. 80(2): 277-287.

Travisi C. M. & Nijkamp P. (2004). Are Italians willing to pay for agricultural environmental safety? A Stated choice approach. Food Safety in a Dynamic World. The 84th EAAE Seminar. 1-20.

Van Hoi P., Mol A. P. J. & Oosterveer P. J. M. (2009). Market governance for safe food in developing countries: The case of low-pesticide vegetables in Vietnam. Journal of Environmental Management. 91(2): 380-388.

Van Loo E. J., Caputo V., Nayga Jr R. M., Meullenet J.-F. & Ricke S. C. (2011). Consumers' willingness to pay for organic chicken breast: Evidence from choice experiment. Food quality and preference. 22(7): 603-613.

Vo Thi Ngoc Thuy (2016). The impact of safety food labels on customer behavior with products of private labels. VNU Journal of Science: Economics and Business. 32(4): 59-66.

Wang J., Ge J. & Ma Y. (2018). Urban Chinese consumers' willingness to pay for pork with certified labels: A discrete choice experiment. Sustainability. 10(3): 1-14.

Wilcock A., Pun M., Khanona J. & Aung M. (2004). Consumer attitudes, knowledge and behaviour: a review of food safety issues. Trends in Food Science & Technology. 15(2): 56-66.

Wongprawmas R., Canavari M. & Waisarayutt C. (2014). Are Thai consumers willing to pay for food safety labels? Choice experiment on fresh produce. The EAAE conference "Agri-Food and Rural Innovations for Healthier Societies", August 26-29, 2014. Ljubljana, Slovenia: 1-14.

Xu L. & Wu L. (2010). Food safety and consumer willingness to pay for certified traceable food in China. Journal of the Science of Food and Agriculture. 90(8): 1368-1373.

Yin S., Wu L., Du L. & Chen M. (2010). Consumers' purchase intention of organic food in China. Journal of the Science of Food and Agriculture. 90(8): 1361-1367.

Yong A. G. & Pearce S. (2013). A beginner's guide to factor analysis: Focusing on exploratory factor analysis. Tutorials in Quantitative Methods for Psychology. 9(2): 79-94.