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**Consumer attitude and behaviour towards food with quality labels  
in urban Vietnam**

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Biological Sciences: Rural Development**

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## List of abbreviations

ADB	Asia Development Bank
ANOVA	Analysis of Variance
AVE	Average Variance Extracted
BDM	Becker-DeGroot-Marschak
CD	Coefficient of Determination
CE	Choice Experiment
CFA	Confirmatory Factor Analyses
CFI	Comparative Fit Index
CGIAR	Consultative Group in International Agricultural Research
CR	Composite Reliability
ECPA	European Crop Protection Association
EFA	Exploratory Factor Analyses
EurepG.A.P.	Euro-retailer Produce Working Group for Good Agricultural Practices
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GlobalG.A.P.	Global Good Agricultural Practices
GM	Genetically Modified
GMXL	Generalized Mixed Logit
GFSR	Global Food Safety Resource
HACCP	Hazard Analysis and Critical Control Points
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
MARD	Ministry of Agricultural and Rural Development
MKD	the Mekong Delta in the South of Vietnam
MNL	Multinomial Logit
OXFAM	Oxford Committee for Famine Relief
PGS	Participatory Guarantee System
QUACERT	National Certification Centre of Vietnam
RMSEA	Root Mean Square Error of Approximation

RPL	Random Parameter Logit
SEM	Structural Equation Models
SRMR	Standardized Root Mean Square Residual
SRP	Sustainable Rice Platform
TLI	Tucker-Lewis Index
VietGAP	Vietnamese Good Agricultural Practices
VFA	Vietnam Food Administration
UN	United Nations
USDA	United States Department of Agriculture
US	United States
WHO	World Health Organization
WTP	Willingness-to-pay

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## **Part One.**

### **Introduction**

#### **Chapter 1. Introduction**

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In Part One, Chapter 1 presents the general introduction of the thesis which includes information about the importance of the study, the conceptual framework of the thesis, the study objectives and research questions, an outline of the thesis and research contributions.



## **1.1 General introduction**

Vietnam has realised remarkable achievements in terms of its continued efforts to improve national food security during the past 30 – 40 years since the introduction of the Doi Moi economic reforms in the late 1980s. These reforms allowed for a more open and competitive market economy and contributed to restructuring the country's agricultural sector. The country experienced severe food scarcity during the period 1976-1980 and had to import 1.7 million tonnes of food per year during this period (Bui & Preechametta, 2016; Liem, 1995). In addition, in 1988, about 9.3 million Vietnamese people in 21 Northern provinces were reported to be suffering from hunger, and 3.6 million were at a critical level of hunger (Son et al., 2006). In the same year, Vietnam had to import nearly 2 million tonnes of rice. Since the land reform in 1989, Vietnam started to become more self-sufficient in terms of self-production of some staple food crops such as rice, and by the early 1990s the country began to have net exports of rice (Son et al., 2006). Since the Doi Moi economic reforms, agricultural exports (e.g. rice, coffee, rubber, tea, cashew nuts, pepper) have made a significant contribution to the national economy (Son et al., 2006). From one of the most difficult economies in the world, suffering from food scarcity and hunger in the 1980s, Vietnam has successfully combated food scarcity and famine and become one of the world's largest rice exporters (Nielsen, 2003).

In this study, we focus on the quality aspects of food in the context of developing countries such as Vietnam. Several reasons justify this focus. These include (i) the current situation of food quality and safety issues in Vietnam; (ii) food labelling in the domestic Vietnamese food market; (iii) the current situation of monitoring and control system of food quality and safety in Vietnam and the use of labelling as a tool to improve food quality and safety in the country; (iv) the need for sustainable agricultural practices in Vietnam; (v) the important role of Vietnam in terms of global food supply; (vi) the growing interest in studies about quality and environmentally friendly food in developing countries; (vii) an increasing demand for quality food particularly in the metropolitan areas in Vietnam. These aspects are further elaborated in this general introduction. In addition, the relevance of selecting rice and vegetables in this thesis is discussed, and a general illustration of the study area is given.

### *1.1.1 Food quality and safety issues in Vietnam*

Food contamination in Vietnam has been repeatedly reported in the literature (Chau et al., 2014; Ha et al., 2008; Hung et al., 2017; Le et al., 2017; World Bank, 2016a). In Vietnam, food may become contaminated at different levels throughout the food supply chain, some of which will be mentioned in detail in the research chapters. Bacterial contamination, the organisation and management of hygienic controls, the use of food or feed additives, and the presence of veterinary drug residues were among the prominent issues that created challenges for the agri-food exports from Vietnam to other markets such as the European Union (EU), the United States (US), or Japan during 2002-2010 (Cuong et al., 2013). From the year 2000 to the beginning of 2009, it has been reported that the causes of food poisoning cases in the domestic food market were from several sources including microbiological (33.2%), bio-toxins (23.5%), chemicals (9.6%), and undetermined (32.1%) (Le Bas & Hanh, 2008). In terms of chemical contamination, such as in the case of crops or vegetables, it is worth noting the value of pesticide imports to the country throughout the years. The rapid population growth in the country has led to an increased demand for food. Pesticide use in agriculture has therefore become common in Vietnam since it contributes to the reduction or prevention of plant diseases. Also, the use of synthetic fertilizers in agriculture is relatively popular as it can help to boost crop productivity. It was reported that the value of pesticide imports, which account for approximately 99% of the total volume of pesticide use in Vietnam, increased from US\$10 million to about US\$159 million between 1990-2004 (Hoe, 2005), and reached about US\$500 million per year (Hoi et al., 2013; 2016) from 2010 onwards. The inefficient management system and weak regulatory mechanisms on the use of pesticides and synthetic fertilizers in agriculture have had many adverse consequences for human health and the environment.

Hung et al. (2017) reported that Vietnam is classified as part of the Western Pacific region, which is ranked in second place worldwide in relation to food-borne diseases. According to the World Health Organization (WHO, 2015a), it is estimated that more than 125 million<sup>1</sup> people in the Western Pacific Region experience illness as a result of contaminated food consumption, resulting in more than 50,000 deaths each year in this region. The estimated cost of food-related problems

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<sup>1</sup> This estimate is calculated based on the estimated 1.5 billion inhabitants (indicating a ratio of 8 in every 100 people got sick from contaminated food) (Hung et al., 2017).



for human health in Vietnam was approximately US\$450 million (World Bank, 2006). In addition, the total annual costs of hospitalisation due to foodborne diarrhoea is estimated at around US\$5.8-6.4 million (i.e. about 0.003-0.004% of the Gross Domestic Product of Vietnam) (Hoang et al., 2015). An overview of the number of officially reported food poisoning cases during 2000-2012 is provided in Table 1.1. Over 12 years, there were more than 2,400 reported outbreaks with over 70,800 cases of food poisoning, causing more than 600 deaths (Vietnam Food Administration (VFA), 2000-2012). These figures emphasize that action to improve food safety and quality in Vietnam should be implemented as soon as possible.

Table 1.1. Number of officially reported food poisoning cases in Vietnam during 2000-2012

Year	Outbreaks	Cases	Deaths	Hospitalisation
2000	213	4,233	59	-
2001	245	3,901	63	-
2002	218	4,984	71	-
2003	238	6,428	37	-
2004	145	3,584	41	-
2005	144	4,304	53	-
2006	165	7,135	57	-
2007	247	7,329	55	5,584
2008	205	7,829	62	6,525
2009	152	5,212	35	4,137
2010	175	5,664	51	3,978
2011	148	4,700	27	3,663
2012	168	5,541	34	4,335
Total	2,463	70,844	645	28,222

(Source: Annual Reports of Vietnam Food Administration (VFA), 2000-2012)

### *1.1.2 Food labelling in the domestic Vietnamese food market*

Before the illustration of the current situation of food labelling in the domestic Vietnamese market, the concepts of food quality, food safety, sustainability are presented. Furthermore the links between these concepts with the food quality certifications in the thesis are described.

“Quality is the total characteristics of an entity (product, service, process, activity, system, organisation, person) that bear on its ability to satisfy stated and implied needs” (Will & Guenther, 2007, p.11; based on ISO 8402:1994; ISO 9000:2000). This indicates that quality is not a single but a dynamic concept (Will & Guenther, 2007). Depending on a producer- or consumer-based approach, quality as a concept is defined. In terms of consumer-based approach, quality is an encompassing concept that includes all characteristics of a product. Food safety and ethical aspects are included in these total characteristics. Thus, food safety is understood as one component of food quality. Ethical aspects, such as environmentally friendly production, welfare (e.g. for the workers, animal welfare, social welfare), are also included under food quality.

The European Commission (2000)<sup>2</sup> defined the concept of food safety as “the assurance that food will not cause adverse health effects to the final consumer when it is prepared and eaten taking into account its intended use”.

Sustainability covers three aspects including an economic (e.g. profit for farmers), an ecological or environmentally friendly (e.g. using environmentally friendly production methods that do not cause damage to the environment), and a social dimension (e.g. welfare for the workers, safety and quality for the consumers as part of social welfare). These aspects are mentioned in the concept of sustainable agriculture by Lütteken and Hagedorn (1999). Hence, sustainability characteristics of food relate to food safety and ethical aspects (environmentally friendly production, welfare). Sustainably-produced foods are those that are produced taking into account sustainability characteristics.

In this thesis, following Will and Guenther (2007), food quality is considered as a dynamic and broader concept that covers all aspects of a product (such as food safety, environmentally friendly, welfare, and other aspects). Hence, in this thesis, food safety is considered as one aspect of food quality. In addition, sustainability aspects of food (including safety and ethical aspects) are also included under food quality, however with broader dimensions than just safety-related aspects.

The link between food quality *aspects* and food quality *labels*, as well as the scope of food quality labels, safety-related labels, sustainable food labels in this thesis are illustrated in Figure 1.1.

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<sup>2</sup> European Commission (2000), [http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52000PC0438\(01\)](http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52000PC0438(01)) (accessed 16.01.18)

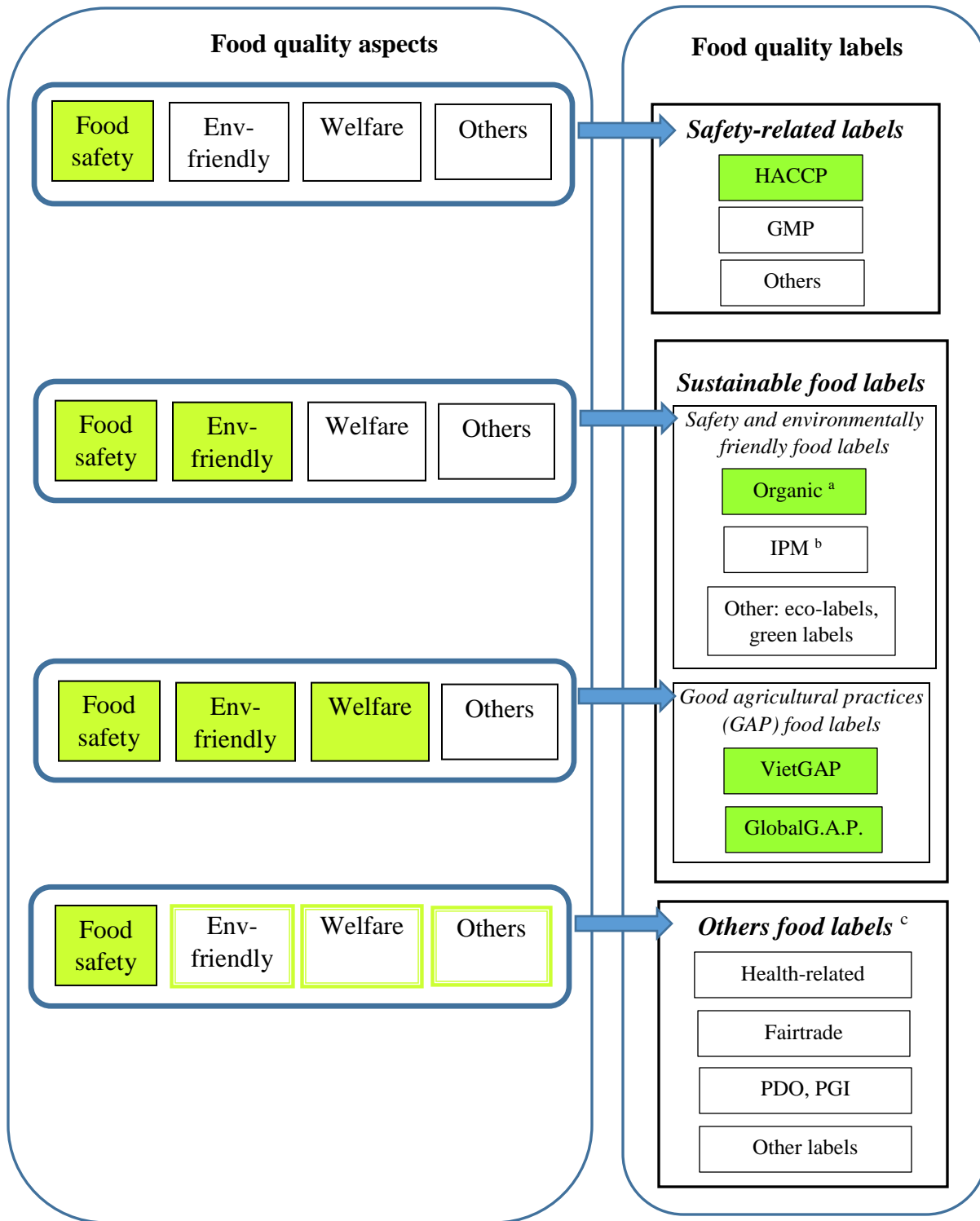


Figure 1.1. The links between food quality *aspects* and food quality *labels* in the thesis

Env-friendly: Environmentally friendly, Welfare (for primary producer, animal welfare depending on specific scheme), HACCP: Hazard Analysis and Critical Control Points, GMP: Good Manufacturing Practice, IPM: Integrated Pest Management, PDO: Protected Designation of Origin, PGI: Protected Geographical Indication. The boxes of food quality labels, that are indicated in green, are in the scope of this thesis, including HACCP, organic, VietGAP, GlobalG.A.P.

<sup>a</sup> This refers to organic scheme in general, in some cases, such as EU organic may also cover welfare aspects.

<sup>b</sup> IPM is not really a scheme, but it is likely a production method.

<sup>c</sup> Depending on the scope of the label, the aspects it covers may be different, for example, Fairtrade food label may cover food safety and welfare aspects.

As mentioned above, food quality aspects include (i) food safety, (ii) environmentally friendly, (iii) welfare (e.g. for worker, for animal depending on the specific scheme) and other aspects. Depending on the focus of the food quality certifications, we may call them as safety-related labels (e.g. HACCP as it focuses on safety aspects), or sustainable food labels (e.g. GAP as it covers safety, environmentally friendly, welfare). These types of food quality labels in Figure 1.1. are based on food quality labels observed in different countries in the literature. This thesis focuses on the labels indicated in the green boxes, as they occur in the domestic Vietnamese food market. In this thesis, all these labels are referred to as food quality labels.

In the Vietnamese food market, there are different types of food quality certification and labelling schemes. Table A1.1 (Appendix A1) illustrates the key food quality schemes in Vietnam. These include the GAP scheme, organic scheme, safety-related scheme. For more details about the concept of the scheme, the year of introduction, goal, and aspects that the scheme covers, we refer to Table A1.1 (Appendix A1). This thesis focuses on the food quality labels, some of which focus on safety-related quality aspects (Hazard Analysis and Critical Control Points (HACCP)), while other refer to broader aspects than just safety-related aspects (good agricultural practices (VietGAP, GlobalG.A.P.), and organic food) (Appendix A2). The GAP schemes differentiate themselves from organic production by allowing the proper use of chemicals in the cultivation practices ((Ministry of Agricultural and Rural Development (MARD), 2008a) while the use of synthetic fertilizers and pesticides is prohibited in organic farming (FAO, 1998).

Good agricultural practices (GAP) food labels relate to the primary production and processing activities that meet the requirements of GAP schemes (standards) such as the national scheme (Vietnamese Good Agricultural Practices (VietGAP)) and the global scheme (Global Good Agricultural Practices (GlobalG.A.P.)) (Appendix A2). 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 in order to improve food quality and safety in Vietnam. The VietGAP standard is currently applied to various food crops such as fruit, vegetables and rice. The MARD issued detailed production guidelines for VietGAP rice following the Decision No. 2998/QĐ-BNN-TT in 2010 (MARD, 2010). Detailed production guidelines for VietGAP vegetables and fruit were issued in 2008 following the Decision No. 379/QĐ-BNN-KHCN of the MARD (MARD, 2008b). The requirements in the production guidelines for VietGAP rice include the evaluation and selection of production area, soil management, selection of rice breeds (origin,

name, varieties that are allowed to use in Vietnam), regulations about the use of fertilizer, irrigation, agricultural chemicals (including plant protection materials), regulations in harvest and post-harvest activities (equipment, materials, containers, warehouse, storage, packaging, transportation), regulations for labour (labour safety, working conditions, training), record keeping, labelling of origin, and product recall. The requirements for the production guidelines of VietGAP vegetables and fruit are relatively similar to that of VietGAP rice, but are more specific to the characteristics of vegetables and fruit. 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).

In terms of the organic food market, 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. In addition, the Vietnamese government does not currently have an official and comprehensive national standard for organic products. There is a basic guideline for organic production in Vietnam (Standard for organic production and processing of the agriculture sector, namely, 10TCN 602-2006) issued in 2006 by the MARD (MARD, 2006). However, this guideline is still very basic and difficult to apply in reality. In 2015, the Ministry of Science and Technology (MOST) issued another document, namely the TCVN 11041:2015 referring to the guidelines for producing, processing and labelling organic products (as supporting materials for the guidelines of the MARD above: 10TCN 602-2006) (MOST, 2015). However, these two documents (10TCN 602-2006 and TCVN 11041:2015) do not really work (i.e. the enterprises do not know how to apply these guidelines). This is due to the fact that criteria for the national organic production standard as mentioned in the two documents are not well defined in detail and are not transparent yet (Hau, 2017).

In this thesis, GAP labels (VietGAP, GlobalG.A.P.) are referred to as sustainable food labels as GAP labels cover safety and ethical aspects (environmentally friendly, welfare (for worker, for animal depending on specific GAP scheme)) (Figure 1.1). Organic is also referred to as a sustainable food label that focuses more on the safety and environmentally friendly aspects (Figure 1.1). In addition, organic and Integrated Pest Management (IPM) are referred to as sustainable production methods (in Chapter 5 of the thesis) as these production methods also cover food safety and environmentally friendly aspects.

### 1.1.3 The monitoring and control system (for food quality and safety) in Vietnam

#### *The use of labelling as a tool to improve food quality and safety*

Food safety can be improved via monitoring and controlling of microbiological<sup>3</sup>, chemical<sup>4</sup>, and physical hazards<sup>5</sup>. According to the WHO (2015b)<sup>6</sup> “the microbial and chemical risks could be introduced at the farm-level (e.g. using water contaminated by industrial waste or poultry farm waste for irrigation of crops). Good agricultural practices should be applied to reduce microbial and chemical hazards”. The microbiological safety of foods can be improved and guaranteed by several efforts. These include “(i) control at the source; (ii) product design and process control; (iii) the application of good hygiene practices during production, processing (including *labelling*), distribution, storage, sale, preparation and use; (iv) the above in conjunction with the application of HACCP system. This preventive system offers more control than end-product testing” (Forsythe, 2000, p.256). In addition, according to the European Commission (EC) (2012), there are different tools to encourage more sustainable food consumption. These include behavioural tools<sup>7</sup>, communication/information provision tools, economic tools<sup>8</sup>, regulatory tools<sup>9</sup> (EC, 2012). Among these tools, communication/information provision tools refer to the use of environmentally friendly *food labels* to provide the “information on a product or service (e.g. product qualities, certification, how to use the product, etc.) to consumers, with the hope that informing the consumer or raising awareness about certain product attributes will influence consumer behaviour” (EC, 2012, p.13 & p.45). Examples of communication/information provision tools are information campaign, labelling and education (EC, 2012, p.15). Therefore, *labelling* is one of the approaches that can be used to improve the food safety and quality and also to encourage more sustainable food consumption.

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<sup>3</sup> “Microbiological hazards include bacteria, yeasts, moulds and viruses” (FSAI, 2018).

<sup>4</sup> “Chemical hazards include water, food contact materials, cleaning agents, pest control substances, contaminants (environmental, agricultural and process e.g. acrylamide), pesticides, biocides and food additives” (FSAI, 2018).

<sup>5</sup> “Physical hazards include glass, packaging, jewellery, pest droppings, screws etc.” (FSAI, 2018).

<sup>6</sup> WHO (2015b), Food Safety: What you should know. [http://www.searo.who.int/entity/world\\_health\\_day/2015/whd-what-you-should-know/en/](http://www.searo.who.int/entity/world_health_day/2015/whd-what-you-should-know/en/) (accessed 26.01.18).

<sup>7</sup> “Behavioural tools aim at influencing consumer behaviour using understanding drawn from a broad field of domains such as psychology, sociology and cultural studies” (EC, 2012, p.13).

<sup>8</sup> “Economic tools are used to introduce price signals and could be used to integrate the costs of pollution into the price of products” (EC, 2012, p.13). Example of economic tools are taxes, subsidies (or incentives), green payment (EC, 2012, p.14).

<sup>9</sup> Regulatory tools relate to laws, rules, regulations that are applied for producers, suppliers (EC, 2012).

### *The monitoring and control system (for food quality and safety) in Vietnam*

In Vietnam, the Food Safety Law was issued based on the laws, rules, and regulations of different government agencies, including the Ministry of Health, the Ministry of Science and Technology, the Ministry of Trade and the MARD. Although the Vietnamese government has made significant efforts to improve the food safety situation in the country, the overlapping functions and unclear allocation of responsibilities across different government agencies have generated several obstacles to the thorough management of the food system. Additionally, ineffectiveness in the implementation of food safety regulations across different institutional levels still persists (World Bank, 2016a). The current uncontrollable growth of various food labels and claims in the Vietnamese food market, together with the lack of an effective management and regulatory system, has led to uncertainty among consumers seeking to match their preferences with food choices. This issue has been indicated in the literature (Verbeke, 2005). Additionally, uncertain, unclear, incomplete and non-transparent information may increase search and information costs for consumers.

According to Kirezieva et al. (2013), a lack of well-defined national policy with detailed food safety legislative acts may attribute to insufficient food safety decision and increasing demand for food safety management system. It is reported that the capacity in terms of monitoring and surveillance of Vietnam is still weak which causes poor food safety management practices in the country ((Asia Development Bank (ADB), 2012). Originating from a weak monitoring and control system for food quality and safety in the domestic Vietnamese food market, there is a need to build an effective regulatory and management system for food with quality labels in Vietnam. In this context, it is important to assess consumers' attitudes and behaviour towards food with quality labels in Vietnam. This will significantly contribute to providing insights into an effective strategy for establishing a food quality labelling system in the country.

Furthermore, to achieve better food safety control, the World Bank (2016a) has suggested the adoption of better agricultural practices, as well as manufacturing practices. In order to obtain this goal, it is recommended a shift towards a more sustainable agricultural production system that generates more benefits for producers, consumers, and the ecosystem with less (or less intensive) use of resources (such as labour, land, water, other natural or harmful inputs). Knowledge- and

skills-based agricultural practices are therefore relevant and important to obtain such a sustainable agricultural production system (World Bank, 2016a).

#### *1.1.4 The need for sustainable agricultural practices in Vietnam*

The need for sustainable agricultural practices in Vietnam is driven by several factors referring to three aspects of sustainability namely, environmental, economic, and social dimensions (Lütteken & Hagedorn, 1999).

##### *Related to environmental dimension*

There is an emerging trend towards sustainable food production and consumption in Vietnam (De Koning et al., 2015; Thong et al., 2017). In 2005, it was reported that about 46% of the total national greenhouse gas (GHG) emissions in Vietnam came from agricultural activities, of which rice cultivation accounted for 44%<sup>10</sup> (Lam, 2016). In addition, Vietnam is among the world's leading rice exporters (Food and Agriculture Organisation of the United Nations (FAO), 2014a). The Mekong Delta (MKD) in the South of Vietnam plays a crucial role in ensuring national and global food security. The MKD is the nation's primary rice-producing region, providing more than half of the national rice production and contributing 90% of Vietnam's rice exports (Hauge, 2016). The MKD is also an important region for the supply of various types of tropical fruit and vegetables, contributing 70% of national fruit exports (VgpNews, 2017a). However, the MKD has been identified as highly vulnerable to climate change (Smajgl et al., 2015). It is estimated that one meter of sea level rise could cause 39% of the MKD to be flooded (Schmidt-Thomé et al., 2015). Also, rice production in the MKD has been reported to be affected by drought and salinity (Consultative Group in International Agricultural Research (CGIAR), 2016). It was estimated that about 159,000 ha of paddy rice had been destroyed by the end of 2015 and 500,000 ha of paddy rice has been at risk by mid-2016 due to saltwater intrusion in the MKD (United Nations (UN), 2016). In addition, the MKD has been reported as suffering from the negative impacts of human activities, such as severe environmental challenges due to the overuse and misuse of agrichemicals (e.g. pesticides, fertilizer) in agricultural activities (Sebesvari et al., 2011) and subsidence and

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<sup>10</sup> The total GHG emissions from agriculture came from several activities including rice cultivation (44.49%), agricultural soils (32.22%), enteric fermentation (11.54%), others (manure management, and field burning of agricultural residues) (11.75%) (Lam, 2016).



rapid coastal erosion due to the negative impacts of dam construction upstream (Anthony et al., 2015).

#### *Related to economic and social dimensions*

The negative impacts of environment-related reasons (e.g. climate change, human activity) can cause environmental pollution in the MKD, which negatively affects producer's (farmer's) profit. Unsustainable farming practices (e.g. unsustainable intensification of shrimp aquaculture (Lan (2013); increased use of pesticides in rice farming practices (Berg & Tam, 2018)) lead to challenges in agricultural production (e.g. soil and environmental pollution) and negatively influence rice productivity and other crops in the MKD (Berg & Tam, 2018; Lan, 2013). Therefore, unsustainable production practices in the MKD may cause loss in farmer's profit (economic impacts). The economic and environmental related impacts will further affect farmer's welfare as well as the safety and security of food supply for the community (social impacts). Therefore, there is a need for more sustainable farming practices in the MKD.

Due to the vital roles of the MKD in both national and world food supply, and the challenges for agricultural production in the MKD relating to the environmental dimension (e.g. potential negative impacts of climate change and human activities on agricultural production), economic dimension (e.g. loss in farmer's profit due to unsustainable production), and social dimension (e.g. negative impacts on the welfare for the society such as insufficient food supply, lack of food safety), it is important to shift agricultural production in the MKD towards a more sustainable production system, including sustainable rice farming practices (Berg et al., 2017; Demont & Rutsaert, 2017).

In addition to the current situation of food quality and safety issues (section 1.1.1), food labelling in Vietnam (section 1.1.2), the current situation of monitoring and control system of food quality and safety in Vietnam (section 1.1.3), and the need for sustainable agricultural practices (section 1.1.4), there are other reasons justify why this thesis focuses on food with quality labels in Vietnam. These are described in the next sub-sections.

#### *1.1.5 The importance of Vietnam in terms of global food supply*

Vietnam has made significant contributions to global food security via the supply of key agricultural crops such as rice, cassava, fruit, coffee, and aquaculture products (Thanh et al., 2017;

World Bank, 2016b). Vietnam is reported as the world's third largest rice exporter (FAO, 2014a; World Bank, 2016b). As shown in Figure A1.1 (Appendix A1), Vietnam was listed among the world's leading rice exporters in 2016.

Despite the high volume of exported Vietnamese rice, Vietnamese rice quality is not yet fully appreciated due to the inferior quality of rice (i.e. rice is inferior (low, medium) quality) and a lack of investment in food quality labelling (e.g. lack of brand information, unclear trademark) (Vietnam Trade Promotion Agency - Export Promotion Center, 2008). In addition, it was reported that while the rice surplus in Vietnam has increased, the rate of stunting children under five has not been improved from 2002-2010 (Thang, 2012). Thus, it is important to further improve the quality of rice for domestic consumption, which can contribute to upgrading the quality of Vietnam's rice exports and establishing its global visibility.

#### *1.1.6 Increasing interest in quality and environmentally friendly food in developing countries*

There is an increasing interest in studies about quality and environmentally friendly food (Chen et al., 2014; Tait et al., 2016; Thøgersen et al., 2016; Yadav & Pathak, 2016) and a growing attention paid to food quality and safety standards (Dou et al., 2015; Hou et al., 2015; Jacxsens et al., 2015; Kirezieva et al., 2015; Lee et al., 2012; Nanyunja et al., 2016; Sonntag et al., 2016; Tey et al., 2015; Unnevehr, 2015; Wongprawmas & Canavari, 2017) in developing and emerging countries. These trends are driven by multiple factors, including the rising incidence of food risks or food safety crises in developing nations (Chen et al., 2015; Grace, 2015; Xue & Zhang, 2013) and emerging interests in sustainable production and consumption in the developing world (Khavul & Bruton, 2013; Shibin et al., 2016).

#### *1.1.7 Increasing demand for quality food in developing and emerging countries including Vietnam*

Over recent decades, there has been a shift in food consumption patterns towards food products that are safer, and are of higher value and better quality (de Haen & Réquillart, 2014; Reisch et al., 2013). In addition, there are increasing food safety concerns in low and middle income countries (Dou et al., 2015; Grace, 2015; Uyttendaele et al., 2016). These changes are motivated by several factors such as income growth, urbanisation, demographic change, globalisation, and wider exposure to communication (de Haen & Réquillart, 2014). Demographic change, for example, migration has been mentioned as one of the causes of food safety risks (Unnevehr, 2003). It is

observed that migration (from rural to urban and from small cities to big cities) in Vietnam poses challenges in terms of ensuring food quality and safety for a rapidly increasing urban population in big cities. With rising income and rapid urbanisation, there is an increasing awareness of food safety issues in developing and emerging countries (Ortega & Tschirley, 2017). Literature has shown an emerging and increasing demand for quality food in developing countries. Demand for organic food has risen in many Asian countries such as Malaysia (Somasundram et al., 2016; Wee et al., 2014), Indonesia (Slamet et al., 2016), India (Yadav & Pathak, 2016), and Thailand (Nuttavuthisit & Thøgersen, 2017). There is also a growing demand for environmentally friendly food in India and China (Tait et al., 2016) or green food in China (Yu et al., 2014; Zhu et al., 2013). In the specific case of Vietnam, demand for quality food has increased, mainly as a result of rising consumer income and rapid urbanisation (Wang et al., 2014) and increasing food safety concerns (Sarter et al., 2014; Wertheim-Heck et al., 2014). This change in consumer preferences offers new market opportunities for food with quality labels.

#### *1.1.8 Focus on rice and vegetables*

In this thesis, rice and vegetables are selected as the focal product categories because they are the most common daily foods for Vietnamese consumers. Rice (i.e. plain rice, sticky rice) represents about 20.3% of the household's budget (i.e. annual total food expenditure) while vegetables and fruit account for 11% of the budget (Hoang & Meyers, 2015). Laillou et al. (2012) reported that rice consumption in Vietnam amounted to more than 300g/person/day. Table A1.2 (Appendix A1) shows the Vietnamese household rice consumption in 2010 by area and consumption segment. The urban population contributed to about 29% of the total national rice consumption value. Noticeably, in Vietnam, rice is the most important crop for both domestic consumption and export. Importantly, Vietnam is the world's third-largest rice exporter (FAO, 2014a). Thus, its rice production makes a significant contribution to global food security (Shrestha et al., 2016) as rice is a primary staple food consumed by nearly half of the world's population (Bhattacharya & Ali, 2016). In addition, Vietnamese consumers have a high consumption of vegetables, on average, compared to other tropical Asian countries. 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 et al., 2015). The precise nature of the product concepts studied in this thesis is spelled out in detail in the research chapters of the thesis.

Several previous studies have focused on the value chain and production systems for rice (Anh & Vang, 2015; Bach et al., 2016; Demont & Rutsaert, 2017) and vegetables (Hoi et al., 2016; Wang et al., 2014). However, there are a limited number of studies on consumers' attitudes and behaviour towards rice and vegetables in a developing country such as Vietnam. In addition, the market for food with quality labels is mostly at an early stage of development, even in the urban areas in Vietnam. In this context, it is relevant and interesting to assess Vietnamese consumers' attitudes and behaviour towards food with quality labels, focusing on urban areas where consumers have better accessibility and affordability to purchase food with quality labels and have more purchasing experience with food quality labels. Later on, similar studies can be conducted in rural areas when demand for food quality labels develops further and extends to these areas.

#### *1.1.9 General illustration of the study area*

Can Tho and Ho Chi Minh cities were selected as the study areas as these cities are among the five municipalities<sup>11</sup> (i.e. centrally-controlled cities and highest-ranked cities) in Vietnam. Ho Chi Minh city has an area of 209.6 ha (0.63% of Vietnam's total area) and a population of 8.15 million people (nearly 8.9% of the Vietnamese population) in 2014 (GSO, 2015), and contributed 20%<sup>12</sup> of national GDP in 2005. Can Tho has an area of 140.9 ha (0.43% of Vietnam's total area), and a population of 1.25 million people (about 1.36% of the Vietnamese population) in 2014 (GSO, 2015). The rapid urbanisation and increasing income of consumers in Ho Chi Minh and Can Tho have led to an emerging demand for food with quality labels in the urban centers of these cities. Therefore, it is interesting to explore consumers' attitudes and behaviour towards food with quality labels in these urban areas.

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<sup>11</sup> Vietnam has 58 provinces and 5 municipalities (From the North to the South: Hanoi, Hai Phong, Da Nang, Ho Chi Minh, Can Tho), where Hanoi and Hai Phong are in the North of Vietnam. Da Nang is in central Vietnam. Ho Chi Minh and Can Tho are in the South of Vietnam.

([https://vi.wikipedia.org/wiki/Thành\\_phố\\_trực\\_thuộc\\_Trung\\_ương\\_\(Việt\\_Nam\)](https://vi.wikipedia.org/wiki/Thành_phố_trực_thuộc_Trung_ương_(Việt_Nam)))

<sup>12</sup> [https://vi.wikipedia.org/wiki/Thành\\_phố\\_Hồ\\_Chí\\_Minh#cite\\_note-66](https://vi.wikipedia.org/wiki/Thành_phố_Hồ_Chí_Minh#cite_note-66)

## 1.2 Conceptual framework for the thesis

In order to investigate consumers' attitudes and behaviour towards food with quality labels, a conceptual framework for the thesis was developed, as presented in Figure 1.2. According to Lavidge and Steiner (1961), there are three components<sup>13</sup> in the psychological model, namely, cognitive, affective, and conative and behavioural factors (Figure 1.2). According to Lavidge and Steiner (1961), the cognitive factors relate to the extent that consumers are aware of a product, i.e. the "rational states". Examples of the cognitive components are awareness, knowledge, thoughts, beliefs, perceptions towards a product (Lavidge & Steiner, 1961; Fiore & Kim, 2007). The affective factors indicate the "emotional" and "feeling states" towards a product. Examples of the affective components include the general attitude (e.g. positive or negative feelings) towards a product, motivations towards food choices. Finally, the conative and behavioural factors refer to the tendency to perform a behaviour, and consumer action or behaviour towards a product, i.e. "striving states" (Lavidge & Steiner, 1961). Examples of conative and behavioural factors are intention to purchase, willingness to purchase and purchase behaviour. According to (Lavidge & Steiner, 1961), the cognitive factors (e.g. awareness, knowledge) may affect the affective factors (e.g. attitude, feelings). Then, the affective factors further influence the conative and behavioural factors (e.g. purchase intention, purchase behaviour). In addition, literature has shown that cognitive factors (e.g. consumers' awareness and knowledge) may determine the affective factors (e.g. consumers' attitudes, motivations) and conative factors (e.g. purchase intention, WTP, purchase behaviour) in a food choice and decision-making context (Grunert, 2011).

Literature on the items related to cognitive, affective, and conative and behavioural components included in the presented conceptual framework is illustrated in the following sub-sections.

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<sup>13</sup> These components were mentioned as three components of attitudes including cognitive, affective, behavioural components of attitudes (Ostrom, 1969, and previous authors cited in Ostrom (1969): Allport, 1935; Harding et al., 1954; Katz & Stotland, 1959; Rosenberg & Hovland, 1960). In this thesis, these three components are referred to as cognitive factors, affective factors, conative and behavioural factors. This is to avoid the confusion between the term "attitude" with "general attitude" as the latter is classified under the affective component.

### *1.2.1 Cognitive factors*

#### *1.2.1.1 Awareness, knowledge and perceived self-competence*

Literature has shown that cognitive components, such as consumers' awareness and knowledge of quality foods, may influence their attitudes and behaviour towards quality foods (Lavidge & Steiner, 1961). Some studies have found that knowledge and awareness have positive effects on the WTP for foods with quality attributes (Akaichi et al., 2012; Haghjou et al., 2013; Lee et al., 2011; McFadden & Huffman, 2017; Xu & Wu, 2010; Zhang et al., 2012). Another cognitive factor is perceived-self competence. Perceived self-competence is used to illustrate "a person's perceived capability to accomplish a certain level of performance" (Druckman & Bjork, 1994, p.174). Perceived self-competence is also referred to the perceived "confidence in achieving certain tasks" (based on Harter (1983); cited in Jambunathan et al. (1999, p.168)). Consumers' perceived self-competence in identifying quality foods may influence their attitudes and behaviour towards these foods. A greater perceived self-competence in choosing organic food relates to a stronger intention to purchase this product (Chrysochoidis, 2000). Based on the important roles of awareness, knowledge and perceived self-competence in understanding consumers' attitudes and behaviour in the literature, in this study consumers' awareness of food quality-related terms, knowledge of food quality certifications, and their perceived self-competence towards identifying quality-certified foods were explored (Figure 1.2).

#### *1.2.1.2 Perceived importance of food quality attributes*

Another cognitive component is the perception of consumers towards the importance of the product quality attributes (i.e. perceived importance of the product attributes) when consumers purchase a certain product (Figure 1.2). There are two major groups of product quality attributes, including intrinsic and extrinsic quality attributes (Fandos & Flavian, 2006; Frez-Muñoz et al., 2016; Kim & Lee, 2015). The intrinsic attributes refer to the functional and physical aspects of the products and these attributes are specific to the product itself. Examples of intrinsic attributes are nutritional content or health benefits, safety aspects, and quality aspects. The extrinsic attributes refer to non-physical aspects of the food product, such as labelling, packaging, brand name, brand image, quality assurance, or information about the manufacturer, for example. Previous studies in developing and emerging countries have shown that intrinsic attributes, such as health aspects (Wee et al., 2014; Yin et al., 2010) and food safety aspects (Saunders et al., 2013; Teng et al.,

2011; Zheng et al., 2013) are important for determining consumers' food choices. In this thesis, "perceived trustworthiness of the product itself" is classified as an intrinsic attribute as it refers to the extent that the product itself is reliable (trustworthy) to consume, for example. "Trust from the point of view of the attitude towards a brand or product, understood as the security of the consumer in the capacity of the brand to carry out its function correctly" (based on Chaudruhi and Holbrook (2001); cited in Herrera and Blanco (2011, p.283)). In this study, trustworthiness refers to the security perception of consumers in terms of whether the product performs its functions correctly. Bhat (2017) mentioned that several food scandals, for example, plastic rice, melamine in milk have become emerging concerns of consumers in developing countries. The issue of plastic rice was also reported in India (Kurunthachalam, 2017), Indonesia (Budiani et al., 2016) and China (Cao et al., 2015). In Vietnam, there was also news related to plastic rice originated from China (Quan, 2015). Although there is no official evidence of this issue, the spread of this type of news may cause concern of this issue among consumers. Thus, the perceived trustworthiness of the product itself, to consume for example, is considered as an important intrinsic aspect of the product.

In addition to intrinsic attributes, extrinsic attributes, such as labelling (Farah et al., 2011) and packaging (Ibitoye et al., 2014; Sakar et al., 2015), are also important in consumers' food choices. Due to the important roles of the intrinsic and extrinsic quality attributes in understanding consumers' attitudes and behaviour towards quality food in the literature, in this study, the perceived importance of food attributes (intrinsic and extrinsic quality attributes) for rice and vegetables were investigated (Figure 1.2).

Literature has shown that perceived intrinsic and extrinsic quality attributes may influence a product's expected quality (beliefs) (Grunert et al., 1996; 2004) which is another aspect of cognitive component that will be presented in the next section.

### *1.2.1.3 Consumers' beliefs*

Beliefs are defined as "the subjective probability of a relation between the object of the belief and some other object, value, concept, or attribute" (Fishbein & Ajzen, 1975, p.131). In addition, consumer belief refers to "a subjective perception of customers about the benefits and quality of the product or the brand's performance on different attributes" (based on Mowen and Minor (2001); cited in Setiyawati et al. (2016)). Literature has indicated that consumers' beliefs shape their attitudes (Fishbein & Ajzen, 1975). In addition, previous studies have shown that consumers'

beliefs in different aspects of quality foods, such as sensory aspects, health aspects, safety aspects, convenience aspects (e.g. perceived availability), value for money (perceptions of price), (e.g. compared to conventional food), may influence their purchase intentions and purchase behaviour towards quality foods. The buyers of organic food have a stronger belief that organic food is tastier compared to conventional food than the non-buyers (Tsakiridou et al., 2008; Van Loo et al., 2013). Health was indicated as an important factor that affects organic food purchase in China (Yin et al., 2010), and Turkey (Ergin & Ozsacmaci, 2011). Mondelaers et al. (2009) found that consumers are willing to pay more for vegetables with a high level of Vitamin A. Perceived product availability was reported as one of the predictors of behavioural intention towards purchasing sustainable dairy products among young purchasers (Vermeir & Verbeke, 2008). Perceived availability had a positive effect on organic food purchase in Turkey (Ergin & Ozsacmaci, 2011) and Malaysia (Hossain & Lim, 2016). Finally, Van Loo et al. (2013) found that frequent buyers of organic products have more positive perceptions about the price of organic food (compared to conventional food) than non-buyers. Due to the important roles of consumers' beliefs in understand consumers' attitudes and behaviour, beliefs about different aspects of quality foods compared to conventional products were investigated in this thesis (Figure 1.2).

#### *1.2.1.4 Consumers' familiarity with food quality certifications*

Familiarity refers to “the number of product-related experiences that have been accumulated by the consumer” (Alba & Hutchinson, 1987, p.411; Jacoby et al., 1986) and plays a key role in consumer preference formation and decision making. Consumers' familiarity with food labels is affected by exposure times and prior knowledge of the labels (Bialkova & van Trijp, 2010). Thus, familiarity has been included under cognitive component in the conceptual framework (Figure 1.2). According to Bialkova and van Trijp (2010), familiarity with food labels (such as some types of logos) is an important driver of consumers' attention to food labels. Due to the important role of familiarity with food labels in consumers' food choice (Alba & Hutchinson, 1987; Bialkova & van Trijp, 2010; Jacoby et al., 1986), consumers' familiarity with food quality certifications has been integrated into this study. As the demand for food products with quality labels has emerged in the urban areas of Vietnam, it is important and relevant to examine to what extent consumers are familiar with different food quality certifications in the domestic food market and the perceptions and attitudes of those who are familiar and unfamiliar with food quality certifications.



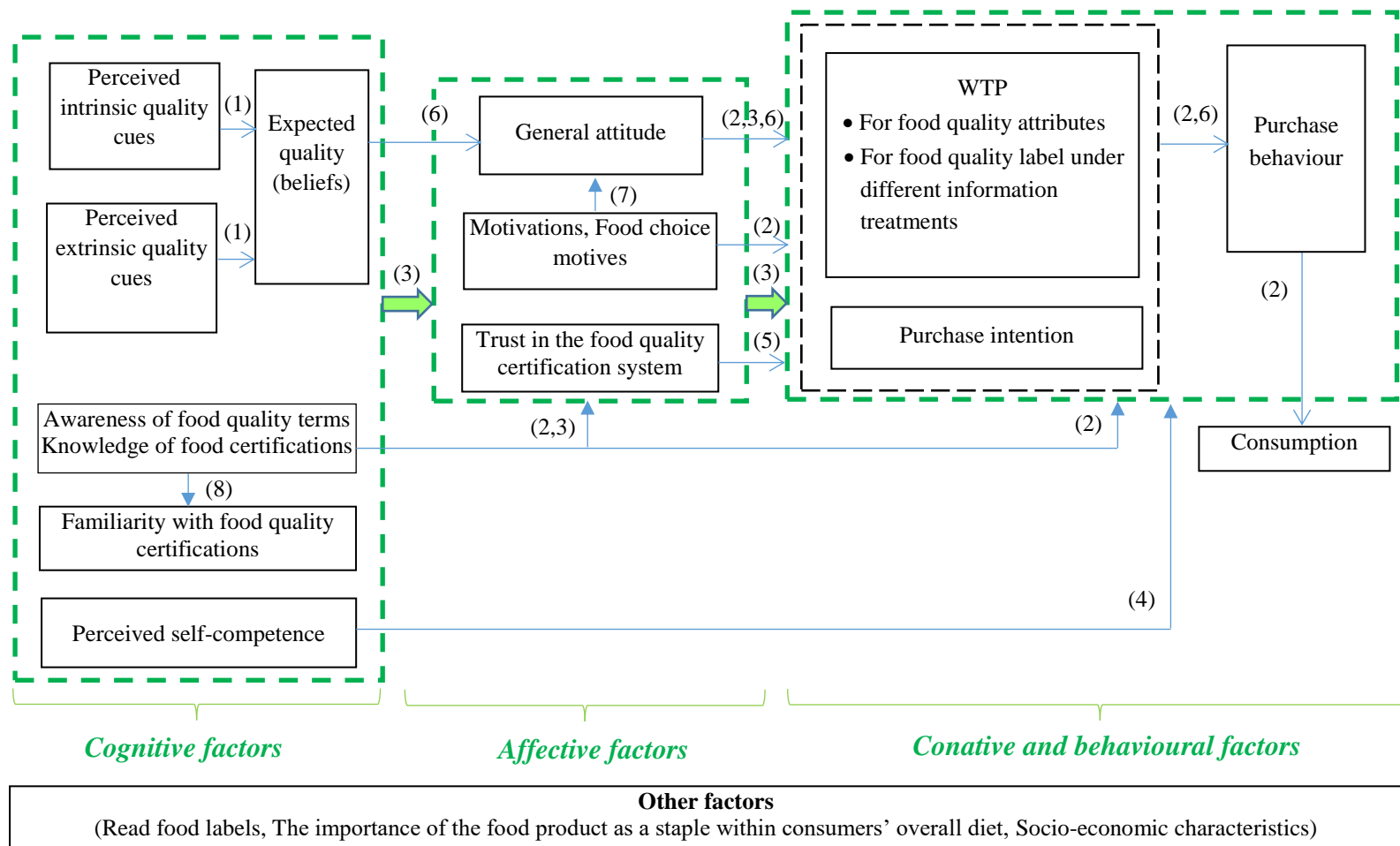


Figure 1.2. Conceptual framework of the thesis for consumer attitude and behaviour towards food with quality labels in urban Vietnam

(1) Grunert et al. (1996; 2004); (2) Grunert (2011), Çabuk et al. (2014), Yadav (2016); (3) Lavidge and Steiner (1961); (4) Chryssochoidis (2000); (5) Nuttavuthisit and Thøgersen (2017), Slamet et al. (2016); (6) Fishbein and Ajzen (1975); (7) Voon et al. (2011); Hsu et al. (2016); (8) Bialkova and van Trijp (2010)

→ : represent associations  
 → : represent associations

### *1.2.2 Affective factors*

Literature has indicated the important roles of affective factors (Burke & Edell, 1989; Fishbein & Ajzen, 1975) in studying consumers' attitudes and behaviour.

#### *1.2.2.1 General attitude*

As mentioned previously, affective factors refer to “emotional” and “feeling states” towards a product (Lavidge & Steiner, 1961). The concept of general attitude refers to “a person’s general feeling of favourableness or unfavourableness toward some stimulus object” (Fishbein & Ajzen, 1975, p.216). In this thesis, the general attitude of consumer has been included under affective component since it indicates the positive or negative feelings of consumers towards a product (Figure 1.2). Previous studies have shown that consumer food choice motives (e.g. environmentally friendly food choice motives (Smith & Paladino, 2010; Voon et al., 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 et al., 2016; Michaelidou & Hassan, 2008)) may influence their general attitude towards food. In addition, affective factors such as consumers' attitudes, food choice motives may affect their preferences (Lavidge & Steiner, 1961) and decision-making (e.g. WTP) (Grunert, 2011). In order to understand consumers' attitudes towards quality foods, general attitudes towards quality-certified food (e.g. general attitudes, i.e. feelings, towards high quality rice and safe vegetables) were investigated.

#### *1.2.2.2 Consumers' food choice motives*

Several studies have reported on the associations between consumers' food choice motives, such as health consciousness, environmental consciousness, and food safety concern with their attitudes and behaviour towards quality foods. Health consciousness was found to positively influence purchase intention for organic food in Malaysia (Salleh et al., 2010), Sri Lanka (Kapuge, 2016), Turkey (Çabuk et al., 2014), Cambodia (Kouy et al., 2016), and among young consumers in India (Yadav, 2016). Previous studies have indicated positive associations between environmentally friendly food choice motives and consumers' attitudes (Smith & Paladino, 2010; Voon et al., 2011; Yadav & Pathak, 2016). Additionally, environmental concern had a positive effect on the purchase intention for organic food in India (Yadav, 2016). Ecological motives positively influenced consumers' involvement in organic food, which further increased their purchase intention for organic food in Taiwan (Teng & Lu, 2016). Literature has shown that motives of food safety

concern were positively associated with consumers' attitudes (Hsu et al., 2016; Michaelidou & Hassan, 2008). In addition, food safety concern had a positive influence on the WTP for safe vegetables in Vietnam (Mergenthaler et al., 2009). Therefore, consumers' food choice motives, such as perceived importance of healthy eating, environmentally friendly motives, and food safety concern were investigated (Figure 1.2).

### *1.2.2.3 Trust in the food quality certification system*

The concept of “perceived trustworthiness of a product itself” was described in section 1.2.1.2. This should be distinguished with another concept of trust, namely “trust in the food quality certification system” which is included under the affective component in this thesis (Figure 1.2). Earle and Cvetkovich (1995) and Trumbo and McComas (2003) distinguished between two types of trust including interpersonal trust and social trust. While interpersonal trust relates to trust in the sources of information, social trust refers to trust in systems and institutions (Avitia et al., 2007; Earle & Cvetkovich, 1995; Giddens, 1990). Social trust is described as “the complex social processes by which people make choices and assign management responsibilities to individuals, groups, or organisation” (Trumbo & McComas, 2003, p.344). In the context of this thesis, trust in the food quality certification system refers towards social trust of the food systems.

Trust in certification schemes was reported to influence purchase intentions towards organic food (Yin et al., 2010) or foods with safety-related labels (Liu et al., 2013) in China. Consumers' trust in the labelling and certification system of organic food was found to have a positive influence on the purchase intention towards organic food in Thailand (Pomsanam et al., 2014), Malaysia (Kai et al., 2013), and Cambodia (Kouy et al., 2016). Thai consumers' trust in international organic certification bodies was similarly found to positively affect organic food purchase (Nuttavuthisit & Thøgersen, 2017). Trust in the quality assurance was shown as a driver of the purchase of assurance-labelled vegetables in China (Revell, 2016). Trust in the retailers and in the certification process were indicated as important drivers of organic food consumption in Canada (Hamzaoui Essoussi & Zahaf, 2009). Trust in the certification was also reported as one of the factors that influence consumers' WTP for organic food in Greece (Krystallis & Chryssohoidis, 2005). Wu et al. (2015) found that more than 45% of Chinese consumers trust the government's food quality certification. Furthermore, Chinese consumers paid price premiums for food products certified by

the government, and they were also willing to pay extra for food products when full information on traceability was provided.

As the literature showed that trust in the food quality certification system is one of the important factors that may influence consumers' attitudes and behaviour towards food quality labels, hence, consumers' trust towards a food quality certification system was investigated in this study.

### *1.2.3 Conative and behavioural factors*

Literature has indicated the important roles of conative and behavioural factors (Fishbein & Ajzen, 1975) (e.g. purchase intention, WTP, purchase behaviour) in studying consumers' attitudes and behaviour. Intention is defined as "a person's location on a subjective probability dimension involving a relation between himself and some action" (Fishbein & Ajzen, 1975, p.288). Behavioural intention indicates "a person's subjective probability that he will perform some behaviour" (Fishbein & Ajzen, 1975, p.288). In terms of consumer behaviour, Fishbein and Ajzen (1975, p.335) defined "overt behaviour as observable acts that are studied in their own right". Schiffman and Kanuk (2007, p.3) defined consumer behaviour as "the behaviour that consumers display in searching for, purchasing, using, evaluating, and disposing of products and services that they expect will satisfy their needs". Consumers' preferences and purchase intention towards food can have impacts on their purchase behaviour (Fishbein & Ajzen, 1975; Grunert, 2011; Lavidge & Steiner, 1961). Consumers' trust in the food quality certification system (Kai et al., 2013; Pomsanam et al., 2014), food choice motives (e.g. environmental concern (Slamet et al., 2016); food safety concern (Mergenthaler et al., 2009)), beliefs in different aspects of organic food compared to conventional food (e.g. sensory aspect (Farah et al., 2011); health benefits (Yin et al., 2010); convenience aspects (Ergin & Ozsacmaci, 2011; Hossain & Lim, 2016)) were found to influence purchase behaviour towards organic food. In order to assess consumer behaviour towards quality food, different aspects of behaviour (such as purchase intention, purchase behaviour, WTP for food quality attributes and WTP for food quality labels under increasing levels of information) were investigated.

### *1.2.4 Other factors*

Other factors such as reading of food labels, the importance of the food product as a staple within consumers' overall diet, socio-economic characteristics may influence consumers' attitudes and

behaviour towards quality food. The effects of reading of food labels before purchasing on their behaviour have been studied in the literature (McFadden & Huffman, 2017; Noussair et al., 2002; Rodríguez et al., 2009; Seetisarn & Chiaravuitthi, 2011; Tegene et al., 2003). Consumers who often read food labels while purchasing new food products are typically found to be willing to pay more for both natural and organic products (McFadden & Huffman, 2017). Rodríguez et al. (2009) similarly found that reading food labels before buying has a significant influence on WTP for organic whole wheat flour and organic aromatic herbs. Food labels only act as a search characteristic when consumers are actively looking for them, though. Noussair et al. (2002), for example, failed to find a significant response to GM food labels in France, and concluded that consumers do not tend to notice labels that they are not looking for in the first place. The importance of the food product as a staple within consumers' overall diet (i.e. whether they eat rice on a daily basis) may also affect attitudes and purchase and eating behaviour with respect to quality attributes. For example, per capita rice consumption and WTP for quality rice were found to be positively correlated in Cameroon (Akoa Etoa et al., 2016) and the Philippines (Cuevas et al., 2016).

The associations between consumers' socio-economic characteristics (such as age, income, education, household size, the presence of young children in the family) and their attitudes and behaviour towards quality food have been explored in previous studies. Literature has indicated positive associations between income and the consumption of organic products in Israel (Becker et al., 2015), the willingness to purchase organic food in China (Yin et al. 2010) and Italy (Gracia & de Magistris, 2007). In the case of rice, while most studies found no evidence of a direct income effect on WTP for quality rice attributes (Akoa Etoa et al., 2016; Demont et al., 2013a; 2013b; 2017; Depositario et al., 2009; Diagne et al., 2017), some studies found a positive effect of direct (Cuevas et al., 2016; Demont et al., 2012; Peterson et al., 2013), and indirect measures of household wealth (Diagne et al., 2017) on WTP. Further, depending on the context, the effect of household size was found to vary from neutral (Akoa Etoa et al., 2016; Demont et al., 2012; 2013a; 2013b; Depositario et al., 2009) to positive (Diagne et al., 2017) or negative (Demont et al., 2017), and the direction of the relationship could vary among income classes (Cuevas et al., 2016).

The associations between education and WTP for rice have been reported in the literature. The effect of education was found to vary from neutral (Akoa Etoa et al., 2016; Demont et al., 2012;

2017; Diagne et al., 2017) to positive (Demont et al., 2013a) or negative (Demont et al., 2013b), and the direction of the relationship could vary among income classes (Cuevas et al., 2016). In addition, Yin et al. (2010) have shown that education and the presence of children in the household did not have significant effects on the willingness to purchase organic food in China. In terms of age, mixed results have been found. Age was found to positively affect WTP in some cases (Cuevas et al., 2016; Depositario et al., 2009), negative in others (Demont et al., 2012; 2013a), while some studies failed to demonstrate any significant relationship (Akoa Etoa et al., 2016; Demont et al., 2013b; 2017; Diagne et al., 2017). Finally, with respect to gender, some studies found that women tend to pay smaller price premiums for quality rice than men (Demont et al., 2017; Depositario et al., 2009).

### **1.3 Research objectives and research questions**

As the intrinsic and extrinsic quality attributes are of high importance in understanding consumers' attitudes and behaviour towards food with quality labels, the first research objective of the study is to explore important aspects (as background information) when studying consumers' attitudes and behaviour towards food with quality labels in urban areas in Vietnam. In order to achieve this goal, the study examines the associations between consumers' perceived importance of food quality attributes and their purchase intentions towards food with quality labels. In addition, different consumer segments are distinguished based on their perceived importance of food quality attributes. Consumer segments are then profiled in terms of their use of, and trust in, different sources of information, and their socio-economic characteristics.

The second objective of the study aims to investigate consumers' attitudes towards food with quality labels, such as in the case of rice and vegetables. With respect to this research objective, consumers' awareness of different food quality-related terms is explored. Next, consumers' familiarity with different food quality certifications in the Vietnamese food market is assessed. Furthermore, to better understand consumers' attitudes towards food with quality labels, the associations between consumers' food choice motives and their general attitudes towards quality-certified foods are investigated.

The third objective of the study is to investigate consumer buying behaviour towards food with quality labels for rice specifically. In this research objective, the study evaluates potential determinants of consumer purchase behaviour towards quality-certified rice. Various drivers are

assessed, such as cognitive factors (consumers' knowledge, beliefs, perceived self-competence), affective factors (trust in the food quality certification system, environmentally conscious motives), and other factors such as reading food labels, the importance of the food product as a staple within consumers' overall diet, and socio-economic characteristics.

The fourth research objective investigates consumers' WTP for quality rice attributes and consumers' WTP for food quality labels for rice under different information treatments. Consumers' WTP for different quality rice attributes, such as sustainable production methods (organic, IPM), health benefit claim, and fair farmer prices are investigated by conducting a choice experiment. Furthermore, in this research objective, consumers' WTP for rice under incremental levels of information which includes quality labelling (certified sustainable production practices (VietGAP)) and other information cues (supplementary information about the certification and traceability) are elicited through experimental auctions. Additionally, the drivers of consumers' WTP for certified sustainably-produced rice are investigated.

The research objectives (RO) and research questions (RQ) for each objective are as follows:

**Research objective 1 (RO1).** Identify important aspects in studying consumers' attitudes and behaviour towards food with quality labels in the Vietnamese food market

RQ1. What is the association between consumers' perceived importance of intrinsic and extrinsic quality cues and their purchase intentions towards food with quality labels?

RQ2. What types of consumer segments can be distinguished based on their perceived importance of intrinsic and extrinsic quality cues? To what extent do consumer segments use, and trust in, different sources of information when buying food?

**Research objective 2 (RO2).** Explore consumers' familiarity with, and their attitudes towards, food quality labels in the Vietnamese food market

RQ3. To what extent are consumers aware of food quality-related terms?

RQ4. To what extent are consumers familiar with different food quality certifications in the Vietnamese food market? What are the characteristics of consumers who are familiar and unfamiliar with food quality certifications?

RQ5. What is the association between consumers' food choice motives and their attitudes towards quality-certified foods?

**Research objective 3 (RO3).** Examine consumer purchase behaviour towards food with quality labels in the Vietnamese food market

RQ6. What determines consumer purchase behaviour towards quality-certified food?

**Research objective 4 (RO4a and RO4b).** Investigate consumers' WTP for quality rice attributes (RO4a) and WTP for food quality labels for rice under different information treatments (RO4b)

RQ7. How much are consumers willing to pay for quality rice attributes?

RQ7a. How much are consumers willing to pay for rice that is produced under sustainable production methods (organic, IPM)?

RQ7b. How much are consumers willing to pay for rice with claimed health benefits?

RQ7c. How much are consumers willing to pay for rice that guarantees a fair price for farmers?

RQ8. How much are consumers willing to pay for rice with food quality labels under increasing levels of information?

RQ8a. What are the effects of different levels of information referring to quality labelling (certified sustainable production practices (VietGAP)) and other information cues (supplementary information about the certification and traceability) on consumers' WTP for sustainably-produced rice?

RQ8b. What determines consumers' WTP for sustainably-produced rice?

The conceptual framework and research objectives and research questions of the thesis are illustrated in Figure 1.3.

#### **1.4 Research design and data sources**

To investigate the research questions in the thesis, data were collected via two cross-sectional studies. The first dataset was collected in June and July 2015 via a consumer survey (n=500) in the two main urban areas in the South of Vietnam, including Can Tho and Ho Chi Minh cities. A



choice experiment was also included in this survey. The second dataset was collected in August 2016 via a consumer survey, together with experimental auctions (n=199) in Can Tho, a large city in the Mekong Delta of Vietnam. Before each survey, pilot tests were conducted to check the clarity of questions and terms used in the questionnaire and to make sure that participants understood the items in the questionnaire. The detailed characteristics of the survey designs and study samples are reported in the respective research chapters in the thesis. The overview of the research design and data sources is presented in Table 1.2.

Table 1.2. Research design and data sources

Research objective	Research question	Thesis chapter	Study method	Statistical analyses method applied
RO1	RQ1, RQ2	Chapter 2	Survey (n=500)	Structural Equation Modelling and Segmentation analysis
RO2	RQ3, 4, 5	Chapter 3	Survey (n=500)	Structural Equation Modelling
RO3	RQ6	Chapter 4	Survey (n=199)	Probit analysis
RO4a	RQ7	Chapter 5	Survey with choice experiment (n=500)	Generalized mixed logit model
RO4b	RQ8	Chapter 6	Survey with experimental auctions (n=199)	Linear regression

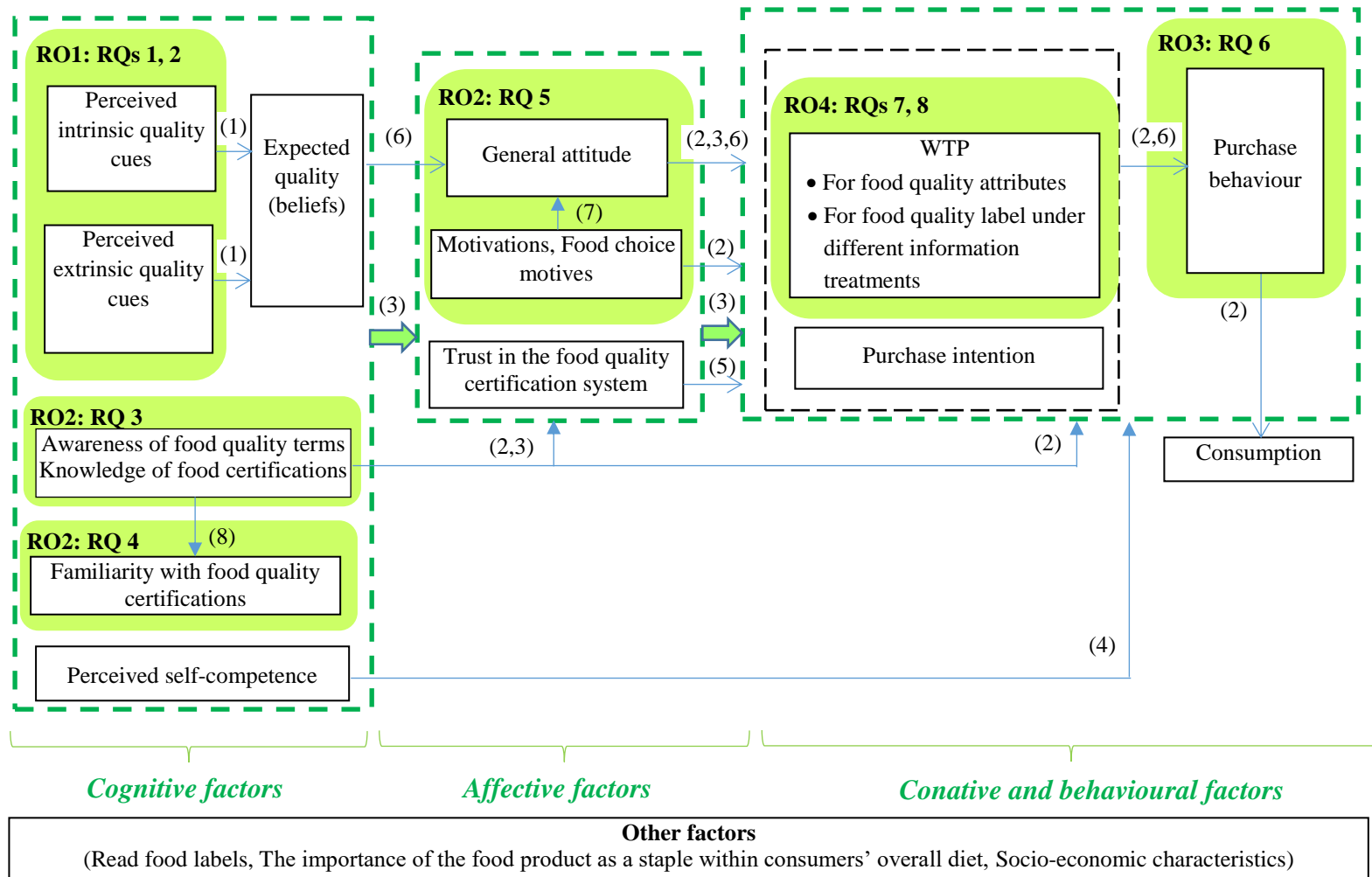


Figure 1.3. Conceptual framework, research objectives (RO) and research questions (RQ) of the thesis for consumer attitude and behaviour towards food with quality labels in urban Vietnam

(1) Grunert et al. (1996, 2004); (2) Grunert (2011), Çabuk et al. (2014), Yadav (2016); (3) Lavidge and Steiner (1961); (4) Chryssochoidis (2000); (5) Nuttavuthisit and Thøgersen (2017), Slamet et al. (2016); (6) Fishbein and Ajzen (1975); (7) Voon et al. (2011); Hsu et al. (2016); (8) Bialkova and van Trijp (2010)

## 1.5 Thesis outline

This thesis consists of four parts. In Part One, Chapter 1 describes the general introduction of the thesis. This includes information about the importance of the study, the conceptual framework for the thesis, the study objectives and research questions, an outline of the thesis, and research contributions. In Part Two, Chapter 2 provides insight into important aspects (as background information) when studying consumers' attitudes and behaviour towards food with quality labels in Vietnam. Part Three explores consumers' attitudes (Chapter 3) and purchase behaviour (Chapter 4) towards food with quality labels. Part Four investigates consumers' willingness-to-pay (WTP) for quality rice attributes (Chapter 5) and WTP for quality rice under increasing levels of information (Chapter 6). In Part Five, Chapter 7 presents the general discussion and conclusions of the thesis. Table 1.3 presents the overview of the thesis chapters, research objectives and research questions in the thesis.

Table 1.3. Thesis chapters and research objectives and questions addressed

Part	Chapter	Title of the chapter	Research objective	Research question
One	1	Introduction		
Two	2	Importance of food quality attributes and purchase intentions towards food with quality labels	RO1	RQ1, RQ2
Three	3	Familiarity with, and attitudes towards, food with quality labels	RO2	RQ3,4,5
	4	Determinants of buying behaviour towards food with quality labels	RO3	RQ6
Four	5	Valuation from a choice experiment	RO4a	RQ7
	6	Valuation from experimental auctions	RO4b	RQ8
Five	7	General discussion and Conclusions		

## **1.6 Research contributions**

All chapters in the thesis contribute to the objective to better explore and understand consumers' knowledge, attitudes, motivations and behaviour towards food with quality labels in the context of urban areas in Vietnam. Based on the results of the thesis, implications are provided for producers, marketers, and policymakers to sharpen their marketing strategy for food with quality labels specifically for rice (and for vegetables for certain aspects) in the domestic food market in Vietnam.

This thesis has three important contributions. First, the thesis makes a significant contribution to the limited existing literature on consumers' attitudes and behaviour towards food with quality labels in the context of developing countries such as Vietnam. Second, the thesis contributes towards using a combination of different methodologies, such as consumer surveys, structural equation models, choice experiment, and experimental auctions to explore and investigate consumers' attitudes, behaviour, preferences and WTP for food with quality labels in the context of urban areas in Vietnam. Third, the study provides useful insights for value chain actors and policymakers in terms of developing an effective marketing strategy for the long term development of a food quality labelling system for rice and vegetables in Vietnam. These contributions are further elaborated in terms of empirical, methodological, and policy contributions.

### *1.6.1 Empirical contributions*

The empirical contributions of this thesis are to investigate consumers' attitudes and behaviour towards food with quality labels in the domestic Vietnamese market. At the moment, the market for food with quality labels is in an emerging stage in Vietnam. There are many challenges in terms of building and implementing effective regulations, monitoring and control mechanisms for these foods with quality labels (ADB, 2012). This thesis focuses on two product categories including rice and vegetables with quality labels (such as VietGAP, GlobalG.A.P., HACCP, organic). Currently, there is still limited literature towards consumers' awareness, knowledge, familiarity towards these types of food with quality labels in Vietnam. This thesis contributes to explore consumers' awareness, knowledge, and their familiarity with different food quality certifications in Vietnam. Importantly, the thesis contributes to provide insights into consumer attitudes and behaviour towards food with quality labels. Results can be used to provide implications for policymakers to build a unique and effective food quality certification system in Vietnam. In addition, results from the thesis provide insights into important aspects that the

producers and marketers should focus in their marketing strategy, in order to improve consumer attitudes, motivations towards food with quality labels, and increase their purchase intention as well as purchase behaviour towards food with quality labels.

Some previous studies described the effects of knowledge and awareness of food quality attributes on the WTP for quality food in the context of developing and emerging countries (Demont et al., 2013a; Diagne et al., 2017; Xu & Wu, 2010; Zhang et al., 2012). This thesis is the first study that assesses both the effects of subjective knowledge and perceived-self competence on consumer purchase behaviour toward rice with quality labels in the context of developing and emerging countries. This study shows that while subjective knowledge plays an important role in consumer WTP for quality rice, it does not significantly influence purchase behaviour towards quality-certified rice. In addition, the perceived self-competence significantly influences the purchase of quality-certified rice. Future research is suggested to include both subjective knowledge and perceived self-competence in their studies to further explore the effects of these cognitive factors on consumer food choices.

Previous studies have explored consumer WTP for rice with different quality attributes in the context of developing and emerging countries, such as organic rice (Kavoosi-Kalashami & Heydari-Shalmani, 2014; Sriwaranun et al., 2015), or rice with health benefits (Depositario et al., 2009; De Steur et al., 2012a). This thesis is the first study that applies choice experiments to assess consumer WTP for rice with a set of quality attributes including sustainable production methods, health benefits, fair farmer prices in the context of developing countries in Asia, more specifically in an important rice producing country such as Vietnam. Results indicate promising opportunities for rice that is produced with sustainable production methods (organic, IPM), rice with claimed health benefits, and rice that guarantees a fair price to farmers in Vietnam.

Several previous auction studies have examined consumer WTP for quality rice in the context of developing countries (Akoa Etoa et al., 2016; Demont et al., 2012; 2013a; 2013b; De Steur et al., 2012a; Diagne et al., 2017). However, there are not many studies in the literature that use experimental auctions to explore consumers' WTP for rice under different information referring to sustainable production practices and traceability, in the developing countries in Asia. Hence, this study contributes to assess the values that consumers place on rice under different information referring to quality labelling (certified sustainable production practices) and other information cues (supplementary information about the certification and traceability) in the context of an important rice producing country. Results indicate that sustainable food labels can be used as a tool to encourage more sustainable farming practices. Importantly, consumers

should be properly informed about the information related to the quality signals. The discussion on the importance of providing proper communication will be illustrated in detail in Chapter 6 of the thesis. Providing consumers with credible, relevant and adequate information can effectively support them to make their food choice decisions.

### *1.6.2 Methodological contributions*

The study uses different methods to assess consumers' attitudes and behaviour towards food with quality labels. Consumer WTP for rice with quality aspects was assessed using two approaches including a choice experiment and experimental auctions. Each method has its own advantages and disadvantages, and contributes to realise different objectives of the study.

The choice experiment is applied to elicit consumers' WTP for different quality rice attributes. The advantage of this method is to observe consumers' preferences for different attributes and their trade-off between different attributes (Gao & Schroeder, 2009). In addition, the choice experiment allows to estimate the marginal values of the attributes, that some revealed preference methods may have difficulty to do this, due to lack of variation, for example (Hanley et al., 1998). However, choice experiment is a stated preference method, which typically suffers, to some extent, from hypothetical bias (i.e. consumers state their WTP, however, they do not have to pay for it) (Hensher, 2010). There are some efforts to account for these limitations which will be presented in detail in Chapter 5 and Chapter 7 of the thesis. Despite these limitations, the choice experiment can give an idea for policymakers about consumer preferences for different quality rice attributes. Results from choice experiment can contribute more insights for policymakers (and also value chain actors such as producers) to make adequate and relevant plan for the allocation of resources, for example, in the agricultural production strategy of the country (and in the production plan of the companies) (Mangham et al., 2009). Also, according to Pearce et al. (2002, p.22), "Economic values expressed in money terms, if properly determined, will reflect people's preferences and can thus be used as weights to inform any policy analysis or decision process".

In order to account for the hypothetical setting, the study applied experimental auctions to elicit consumers' WTP for rice under different information conditions referring to sustainable agricultural practices and traceability. An advantage of this method is the incentive compatibility and the use of a more realistic setting (compared to stated preference method) where consumers have opportunities to exchange real goods with real money (Lusk & Shogren, 2007). However, in order to obtain good results, the design and implementation of the

experimental auctions have to be conducted carefully. In addition, the experimental auctions may require more resources (e.g. time, cost) to conduct (Kimenju et al., 2006).

### *1.6.3 Policy contributions*

Food quality and safety is a very important issue in the developing and emerging countries (Grace, 2015; Uyttendaele et al., 2016), particularly in the context of urban areas where demand for food with quality labels is increasing rapidly. In this context, the government and authorities of the developing countries (including Vietnam) often do not have effective mechanisms to control and relevant tools to ensure food quality and safety for the country. This study explores consumer attitude and behaviour towards quality labelling as a tool to ensure food safety and to encourage more sustainable farming practices in Vietnam. This can contribute to providing a more comprehensive view on how foods with quality labels are perceived and evaluated by consumers. This can contribute more insights for policymakers in terms of the decision on whether labelling is an effective tool, among other tools, that can be employed to ensure food safety for the country and to promote sustainability in food production and consumption.

Due to many challenges in the agricultural production of the country, particularly in the MKD, the Vietnamese government has shown an increasing interest in a sustainable agricultural production system (VgpNews, 2017a; VgpNews, 2017b; VietnamNews, 2017). Specifically, the government has just recently (in the end of 2017) adopted the strategy for sustainable development of the agricultural production in the Mekong Delta region. In this context, this study provides crucial insights for the government, policymakers, and value chain actors in terms of the strategy for building a labelling system for quality food (e.g. food with sustainability characteristics) (in the case of rice and vegetables) in Vietnam. Results from Chapter 6 provide evidence about the value Vietnamese consumers place on a national good agricultural practices label, which might be crucial in convincing farmers, suppliers and food and agriculture value chain actors to adopt more sustainable practices.

Based on the results, the thesis provides implications in terms of important aspects that producers and marketers should focus on to improve their products according to consumers' attitudes, preferences, and behaviour towards food with quality labels. In addition, the thesis suggests possible approaches that the policymakers should concentrate on to improve consumers awareness, attitude and behaviour towards food with quality labels (including sustainably-produced food) and to effectively provide relevant supports to producers.





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## **Part Two. Study background**

### **Chapter 2. Importance of food quality attributes and purchase intentions towards food with quality labels**

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This chapter explores important aspects (as background information) when studying consumers' attitudes and behaviour towards food with quality labels in the Vietnamese food market. In Chapter 2, the associations between consumers' perceived importance of intrinsic and extrinsic quality cues and their purchase intentions towards food with quality labels are explored.

This chapter investigates the following research questions:

RQ1. What is the association between consumers' perceived importance of intrinsic and extrinsic quality cues and their purchase intentions towards food with quality labels?

RQ2. What types of consumer segments can be distinguished based on their perceived importance of intrinsic and extrinsic quality cues? To what extent do consumer segments use, and trust in, different sources of information when buying food?

Hypotheses:

Consumers' perceived importance of intrinsic and extrinsic quality cues are positively associated with their purchase intentions towards food with quality labels.



## 2.1 Abstract

This chapter investigates the associations between consumers' perceived importance of food quality attributes and their purchase intentions towards food with quality labels in the case of rice and vegetables using structural equation models. Cross-sectional data were collected in 2015 by means of a consumer survey (n=500) in selected urban areas in the South of Vietnam. Results showed that the perceived importance of intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) are directly and positively associated with consumers' purchase intentions towards high quality rice and safe vegetables. Communication on the intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) is highly recommended to increase consumers' purchase intentions towards high quality rice and safe vegetables. In addition, communication of information about food quality labels via supermarket is promising as this source of information is used relatively often when consumers purchase food.

**Keywords:** Consumer; Purchase intention; Labelling; Quality; Rice; Vegetables

## 2.2 Introduction

Food quality aspects have become increasingly important in developing and emerging countries. Different quality related aspects such as food safety concerns (Saunders et al., 2013; Teng et al., 2011; Zheng et al., 2013), health aspects (Wee et al., 2014; Yin et al., 2010), quality traits (Farah et al., 2011) were reported as important credence attributes in consumers' food choices in developing and emerging countries. Other studies indicated that consumers' food choices in developing countries were influenced by credence attributes relating to food labelling (Farah et al., 2011) and packaging characteristics (Ibitoye et al., 2014; Sakar et al., 2015). These trends emphasize that it is important and relevant to investigate the perceived importance of food quality attributes, and their associations with consumers' purchase intentions towards food with quality labels in the context of developing and emerging countries.

Food safety related issues were reported at different stages in the food supply chain in Vietnam. Poor production practices (Chau et al., 2014; Hong, 2016; Wertheim-Heck & Spaargaren, 2016) were regularly reported, for example, microbial and parasitic contamination on fresh vegetables sold in traditional markets (Chau et al., 2014), the presence of Salmonella in pork meat (Le Bas et al., 2008; Sarter et al., 2014) and also in chicken meat (Sarter et al., 2014) were reported in Vietnam. Also, the misuse of antibiotics was indicated (Huong & Le Bas, 2008; Sarter et al., 2014). In addition to poor production practices, the use of contaminated washing water in post-

harvest practices (Ha et al., 2008), and the incorrect use of food additives in food processing activities (Le et al., 2017) were recorded. Lastly, improper food handling and unhygienic operating conditions, for example among street vendors (Samapundo et al., 2016) were also reported. As a consequences of food safety related issues, from 2000 to the beginning of 2009, the number of officially reported food poisoning cases were over 1,831 outbreaks in Vietnam causing 499 deaths (Le Bas & Hanh, 2008). From 2000 to 2010, the number of officially reported food poisoning cases raised to 2,147 outbreaks, causing 583 deaths (Sarter et al., 2012). Due to increasing food safety concerns (Sarter et al., 2014; Wertheim-Heck et al., 2014) and increasing income and rapid urbanisation (Wang et al., 2014), the demand for food with quality labels has emerged among urban Vietnamese consumers. In this context, investigation of the associations between consumers' perceived importance of food quality attributes and their food choice decisions is highly important and relevant to provide insights for policymakers in terms of developing a quality labelling system for food in Vietnam.

Consumers assess the product quality based on two major groups of product quality attributes, namely intrinsic and extrinsic quality attributes (Fandos & Flavian, 2006; Frez-Muñoz et al., 2016; Kim & Lee, 2015). Intrinsic quality attributes relate to the functional and physical aspects of food (Fandos & Flavian, 2006). In addition, intrinsic attributes are more specific to the product itself (Olson & Jacoby, 1972). Extrinsic quality attributes refer to non-physical aspects of food products such as labelling, packaging, brand image (Fandos & Flavian, 2006). These are strongly associated with the product. Due to the important roles of intrinsic and extrinsic quality attributes in understanding consumers' attitudes and behaviour towards quality foods, in this chapter, the perceived importance of intrinsic and extrinsic food quality attributes in the Vietnamese food market were investigated.

Rice and vegetables are selected as the focal product categories because they are the main daily foods for Vietnamese consumers. Importantly, rice is a strategic food crop in Vietnam. The reasons for selecting rice and vegetables in this study were illustrated in detail in Chapter 1 (the general introduction of the thesis). The majority of the studies have focused on the value chain and production systems of rice (Anh & Vang, 2015; Bach et al., 2016; Demont & Rutsaert, 2017) and vegetables (Hoi et al., 2016; Wang et al., 2014), however, there are a limited number of studies on consumers' attitudes and behaviour towards rice and vegetables in a developing country such as Vietnam. Therefore, the objective of this chapter is to investigate the associations between consumers' perceived importance of food quality attributes and their purchase intentions towards high quality rice and safe vegetables (Appendix A2). In addition,

segmentation analyses were performed based on the perceived importance of rice and vegetables attributes. Furthermore, consumers' use, and trust in different sources of information based on their perceived importance of food quality attributes were investigated.

## **2.3 Literature review**

### *2.3.1 Perceived importance of intrinsic quality cues and purchase intentions*

The associations between consumers' perceived importance of intrinsic attributes (e.g. health, quality, safety, trustworthiness) and their purchase intentions were investigated in the literature. Health aspects were found as positive factors that influence purchase intention towards organic foods in Malaysia (Wee et al., 2014) and consumer food choice attitudes in Spain (Carrillo et al., 2011). Health concern was found as a driver of purchase intention towards organic food in China (Yin et al., 2010). Health related attribute was shown to have a positive effect on the WTP for organic products (Mondelaers et al., 2009) and on the purchase intention towards sustainably sourced food (Dowd & Burke, 2013). In addition, quality attribute was found to influence purchase frequency of rice in Malaysia (Farah et al., 2011). Safety aspects were indicated to have positive effects on the purchase intentions towards organic foods (Wee et al., 2014) and green foods (Teng et al., 2011) in Malaysia. Food safety and health concerns, and trust were reported to influence organic food purchase in Indonesia (Slamet et al., 2016). Additionally, previous studies found positive associations between consumers' trust in food label in Thailand (Pomsanam et al., 2014) and trust in organic food in China (Yin et al., 2010) with their purchase intentions towards organic food. The above mentioned studies have indicated the important roles of intrinsic quality attributes in consumers' food choices in developing and emerging countries. Hence, it is relevant to assess the associations between consumers' perceived importance of intrinsic quality traits (e.g. health, quality, safety, trustworthiness aspects of food) and their purchase intentions towards quality food in a developing country such as Vietnam.

### *2.3.2 Perceived importance of extrinsic quality cues and purchase intentions*

The associations between consumers' perceived importance of extrinsic attributes (e.g. product labelling and packaging characteristics) and their purchase intentions were reported in the literature. Labelling attribute refers to a reliable signal that can support consumers in the evaluation of product quality (Grunert et al., 2001; Jeddi & Zaiem, 2010). As the trend towards healthy eating has increased, food label plays a vital role in offering consumers the opportunity to carefully make their buying decision towards food (Coulson, 2000). Food labelling can

contribute to increasing the credibility of food products (Jeddi & Zaiem, 2010) and is crucial in the first time purchase as Singla (2010) reported that 82% of consumers in their study used (i.e. read) the label when buying food for the first time. Food labelling related perceptions were found to be positively associated with purchase behaviour towards food product in Malaysia (Latiff et al., 2016) and to positively influence purchase intention of food in Tunisia (Jeddi & Zaiem, 2010). Food labelling attribute such as brand was found to influence purchase frequency of rice in Malaysia (Farah et al., 2011). Birol et al. (2009) indicated that Indian consumers were willing to pay extra for food product produced under quality label such as Global Good Agricultural Practices (GlobalG.A.P.) scheme.

In addition to product labelling aspects, packaging characteristics were reported as important factors in consumers' food choices. Sakar et al. (2015) found that packaging characteristic has a significant influence on the purchase intention towards rice in India. Also, packaging was described as an important factor that may influence purchase intention towards organic rice in Malaysia (Ibitoye et al., 2014). Schnettler et al. (2008) indicated that packaging and origin are among the important drivers in consumers' purchase decision towards rice in Chile. Vernekar and Wadhwa (2011) found that ecological friendly packages are important in Indian consumers' food choices. Due to the important roles of extrinsic quality cues (e.g. product labelling, packaging) in consumers' food choices in developing and emerging countries, it is relevant to evaluate the associations between consumers' perceived importance of extrinsic quality traits (e.g. labelling, packaging) and their purchase intentions towards quality food in Vietnam.

### *2.3.3 Communication of food quality labels in Vietnam*

Currently, there is insufficient (e.g. no concrete label information) and inefficient (e.g. improper, non-selective message) communication of information on food quality labels to Vietnamese consumers. In order to communicate important aspects of food quality labels to consumers, it is important to assess what sources of information that consumers use when purchasing food and to what extent consumers trust in different sources of information. Thus, consumers' use, and trust in different sources of information when buying food based on their perceived importance of food quality attributes were investigated in this chapter.

## **2.4 Materials and methods**

### *2.4.1 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 developed in English and translated from English into Vietnamese by professional translators. Pilot tests were conducted to verify the clarity of the questions and terms used. After revisions based on the pilot tests, the questionnaire was finalised. 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 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 household food shoppers for rice and vegetables, 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. In addition, they were asked to indicate their use, and trust in different sources of information when purchasing food. In the next section, consumers were asked to complete choice experiment questions for rice. This was followed by an assessment of socio-economic characteristics.

The socio-economic characteristics of the sample are illustrated in Table 2.1. 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 represented different age and education categories. About half of the respondents are below 40 years. In addition, around half of the participants have a college or a higher degree. Approximately 60% of the participants reported having a medium financial status. An overview of the characteristics of the sample and of the population is provided in Table A3.1 (Appendix A3). The sample has a little bit higher education level on average compared to the population of the country in general. Other characteristics such as age and occupation are relatively representative for the population.

Table 2.1. Characteristics of the sample (% , n=500, June-July 2015)

Gender	%	Occupation	%
Male	16.8	Full time	48.2
Female	83.2	Part time	17.4
Age (years)	40.5 <sup>a</sup> (11.6) <sup>b</sup>	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	Having children under 14 years	
High school	21.8	Yes	54.2
Higher education (not university)	20.2	No	45.8
University and upper	28.8		

<sup>a</sup>Mean age measured in years; <sup>b</sup>Standard deviation of age

#### 2.4.2 Measures

Previous studies have shown that consumers' perceived importance of food attributes such as intrinsic attributes (Farah et al., 2011; Saunders et al., 2013; Teng et al., 2011; Wee et al., 2014; Yin et al., 2010; Zheng et al., 2013) and extrinsic attributes (Farah et al., 2011; Ibitoye et al., 2014; Sakar et al., 2015) are important in consumers' food choices in the context of developing and emerging countries. Thus, consumers' perceived importance of food quality attributes and their purchase intentions towards food with quality labels were investigated in the case of both rice and vegetables. In addition, consumers' use, and trust in different sources of information when purchasing food were investigated.

##### *Consumers' perceived importance of food quality attributes*

Consumers' perceived importance of rice attributes (Table 2.2) were investigated by asking "Please indicate how importance the following characteristics of rice are to you?". Answers were on a 5-point scale ranging from "unimportant" (1) to "very important" (5). In addition, consumers' perceived importance of vegetables attributes were also assessed on a similar 5-point scale (Table 2.3).



### *Purchase intention*

Consumers were asked how likely they expected, planned and desired to purchase high quality rice in the next 7 days (Table 2.2). Answers ranged from “very unlikely” (0) to “very likely” (7) (Van Loo et al., 2013). A similar question was used to measure the purchase intention for safe vegetables (Table 2.3). 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).

### *Use of information sources*

Consumers’ use of different sources of information including from supermarket, the Internet, TV, radio, advertising, the government, consumer organisation, family and friends, experts, local market sellers, food industry, and food package, when buying food was investigated by asking “How often do you use information from the following sources when buying food?”. Answers were on a 6-point scale from “never” (1) to “very frequently” (6).

### *Trust in information sources*

Consumers’ trust in different sources of information including from supermarket, the Internet, TV, radio, advertising, the government, consumer organisation, family and friends, experts, local market sellers, food industry, and food package, when buying food was investigated by asking “To what extent do you trust the information about food from the following sources?”. Answers ranged from “completely distrust” (1) to “completely trust” (7).

### *2.4.3 Data analysis*

Data were analysed using the software program SPSS 24.0 (SPSS Inc., Chicago, IL, USA) and STATA 13.0. Statistical significance was set at  $\alpha=0.05$ . Following Anderson and Gerbing (1988), a two-step analysis procedure was applied. First, a confirmatory factor analysis<sup>14</sup> was performed to assess the internal consistency, construct validity (convergent validity and discriminant validity) of the constructs in the measurement model. The internal reliability consistency of the multi-item scales was assessed with Cronbach’s  $\alpha$ . Cronbach’s  $\alpha$  with a value of more than 0.7 indicates adequate internal consistency (Hair et al., 2010). In addition, the composite reliability (CR) was used to assess the construct validity (Fornell & Larcker, 1981) and should exceed the threshold of 0.70. Individual item loadings for constructs with a value

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<sup>14</sup> Depending on the normality assumption is assumed or not assumed, appropriate estimation method is applied.

greater than 0.5 are acceptable (Hair et al., 2010). Convergent validity means that “whether measures of a construct actually converge the intended latent variable or share a high proportion of variance in common” (Pieniak et al., 2010, p.584). 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). Discriminant validity indicates “whether the constructs are distinct from each other” (Pieniak et al., 2010, p.584). It is suggested that the discriminant validity should be assessed by comparing the AVE of the constructs with the squared correlation coefficient between the constructs (Hair et al., 2010; based on Fornell and Larcker (1981)). The AVE estimate should be greater than the interconstruct squared correlation estimates. Next, the structural modelling is performed to examine the hypotheses of the study.

Two structural equation models (SEM), one for high quality rice and one for safe vegetables, were performed to investigate the associations between potential determinants (i.e. perceived importance of food quality attributes) and purchase intentions. 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 the goodness-of-fit indices:  $\chi^2/df$ , 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). Also, the  $\chi^2$  and p-value were evaluated. However, the  $\chi^2$  was reported to be sensitive to the sample size (Hu & Bentler, 1999) (i.e. when the sample size is large, the p-value of  $\chi^2$  is usually significant). Thus it is suggested that the ratio  $\chi^2/df$  should be used to check if the model is recommended or not, a value less than 3 (Carmines & McIver, 1981) or less than 5 (Taylor & Todd, 1995) indicating acceptable fit.

Furthermore, segmentation analyses were applied for the perceived importance of food quality attributes. Descriptive statistics such as one-way ANOVA, chi-square association tests were applied to profile consumers’ characteristics for different segments.

Before conducting confirmatory factor analysis, in order to determine the dimension of food quality attributes (which items are grouped under intrinsic attributes and which items are grouped under extrinsic attributes), the exploratory factor analyses were performed for the

perceived importance of food attributes included in the two models, one for high quality rice and one for safe vegetables. There were no cross-loadings of concern, i.e. equal to or above 0.40 (Hair et al., 2010). Perceived trustworthiness was grouped with safety, quality, and health in the same component which refers to “intrinsic attributes”. From the consumer-based classification approach for product attributes, safety, quality, health are credence attributes. From the producer-based classification approach for product attributes, safety, quality, health are intrinsic attributes. The exploratory factor analyses of the perceived importance of food attributes showed that perceived trustworthiness of the product itself was grouped with safety, quality, health in the same component. This suggests that perceived trustworthiness of the product itself is based on and related to intrinsic attributes. Thus, in this study, safety, quality, health, trustworthiness have been included under intrinsic attributes. Packaging and product label were grouped together in the same component, namely “extrinsic attributes”. Literature usually suggests to use at least three items per construct. In the case of extrinsic attributes, only two items are included in this construct. Some previous studies reported that the use of two items per construct is also acceptable (Bollen, 1989; Kline, 2013). First, we have a relatively large sample (n=500). In addition, in the construct of extrinsic attributes, the two items, product labelling and packaging, contribute to the same dimension. The internal consistency of the extrinsic attributes with these two items exceeds the threshold of 0.7. The composite reliability of this construct also exceeds 0.7. The average variance extracted of this construct is larger than 0.5. Thus, these two items fulfil the criteria to be grouped into the construct, further referred to as “extrinsic attributes” in the analysis.

## **2.5 Results**

### *2.5.1 Factors affecting purchase intentions towards quality food*

First, the confirmatory factor analyses (CFA) were performed for the data in the model for high quality rice and in the model for safe vegetables (Table 2.2 and Table 2.3). The normality assumption in both models was not satisfied. Hence, the quasi maximum likelihood estimation models with robust standard error were applied (Model for rice: SRMR= 0.025, CD= 1.00; Model for vegetable: SRMR= 0.014, CD= 0.99)<sup>15</sup>. The standardized factor loadings, reliability, and validity estimates were evaluated. The individual item loadings for all constructs were all highly significant with values between 0.66 to 0.96 in the model for high quality rice, and between 0.65 to 0.96 in the model for safe vegetables. The reliability estimates (i.e. Cronbach’s

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<sup>15</sup> Other goodness-of-fit measures such as RMSEA, CFI are not relevant due to the method used in this case.

$\alpha$ ) for the constructs ranged from 0.78 to 0.96 in the model for high quality rice, and from 0.72 to 0.96 in the model for safe vegetables, indicating adequate internal consistency (Hair et al., 2010). The composite reliability estimates (CR) for the constructs ranged from 0.80 to 0.96 in the model for high quality rice and from 0.73 to 0.96 in the model for safe vegetables, indicating adequate construct validity. 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. Correlation coefficients between variables used in the model were assessed. All correlation coefficients were significantly below 0.70, indicating no concern over multicollinearity in the present data (Tabachnick & Fidell, 2001). Following the procedure recommended by Hair et al. (2010) the discriminant validity was evaluated. 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 show that the CFA supports the measurement models.

Table 2.2. Confirmatory factor analysis for rice (n=496, June-July 2015)

Construct and items	Standardized factor loadings	SE	p-value	Composite reliability (CR)	Average variance extracted (AVE)
<i>Intrinsic attributes</i>				0.90	0.69
Safety	0.91	0.02	<0.001		
Quality	0.85	0.03	<0.001		
Health value	0.79	0.04	<0.001		
Trustworthiness	0.76	0.04	<0.001		
<i>Extrinsic attributes</i>				0.80	0.68
Package	0.66	0.06	<0.001		
Product label	0.96	0.07	<0.001		
<i>Purchase intention</i>				0.96	0.90
I expect to buy high quality rice in the coming 7 days	0.93	0.01	<0.001		
I plan to buy high quality rice in the coming 7 days	0.96	0.01	<0.001		
I desire to buy high quality rice in the coming 7 days	0.95	0.01	<0.001		

SE: Standard Error, SRMR= 0.025, CD= 1.00

Table 2.3. Confirmatory factor analysis for vegetables (n=493, June-July 2015)

Construct and items	Standardized factor loadings	SE	p-value	Composite reliability (CR)	Average variance extracted (AVE)
<i>Intrinsic attributes</i>				0.85	0.59
Safety	0.80	0.03	<0.001		
Quality	0.78	0.04	<0.001		
Health value	0.76	0.05	<0.001		
Trustworthiness	0.74	0.03	<0.001		
<i>Extrinsic attributes</i>				0.73	0.58
Package	0.65	0.05	<0.001		
Product label	0.86	0.05	<0.001		
<i>Purchase intention</i>				0.96	0.90
I expect to buy safe vegetables in the coming 7 days	0.93	0.01	<0.001		
I plan to buy safe vegetables in the coming 7 days	0.95	0.01	<0.001		
I desire to buy safe vegetables in the coming 7 days	0.96	0.01	<0.001		

SE: Standard Error, SRMR= 0.014, CD= 0.99

Based on the CFA, two structural models were performed to analyse factors that influence purchase intentions towards high quality rice and safe vegetables (Table 2.4). Both models performed well, as supported by the satisfactory goodness-of-fit indices (model for high quality rice:  $\chi^2 = 41.571$ ,  $df = 24$ ,  $p = 0.014$ ,  $\chi^2/df = 1.73$ , RMSEA= 0.038, SRMR= 0.025, CFI= 0.995, TLI= 0.992, CD= 0.993; model for safe vegetables:  $\chi^2 = 22.271$ ,  $df = 24$ ,  $p = 0.563$ ,  $\chi^2/df = 0.93$ , RMSEA< 0.001, SRMR= 0.014, CFI= 1.000, TLI= 1.000, CD= 0.966). The model for high quality rice explained 12% of the variance in consumers' purchase intention towards high quality rice. The model for safe vegetables explained 24% of the variance in consumers' purchase intention towards safe vegetables.

Results showed that the perceived importance of intrinsic aspects is positively and directly associated with purchase intentions in the case of both high quality rice and safe vegetables. This implies that consumers who have higher perceived importance of intrinsic attributes (i.e. health, safety, quality, trustworthiness) have higher intention to purchase high quality rice and

safe vegetables. In addition, the perceived importance of extrinsic attributes is positively and directly associated with purchase intentions in the case of both high quality rice and safe vegetables. This indicates that consumers who have higher perceived importance of extrinsic attributes (i.e. product labelling and packaging characteristics) have higher intention to purchase high quality rice and safe vegetables.

Table 2.4. Standardized solution of structural equation models for high quality rice and for safe vegetables (June-July 2015)

	Purchase intention towards high quality rice (n=496)			Purchase intention towards safe vegetables (n=493)		
	Coefficient	SE	p-value	Coefficient	SE	p-value
Intrinsic attributes	0.90	0.15	<0.001	0.86	0.18	<0.001
Extrinsic attributes	0.22	0.10	0.035	0.75	0.13	<0.001

SE: Standard Error; Model for high quality rice:  $\chi^2 = 41.571$ ,  $df = 24$ ,  $\chi^2/df = 1.73$ ,  $p = 0.014$ , RMSEA= 0.038, SRMR= 0.025, CFI= 0.995, TLI= 0.992, CD= 0.993. Model for safe vegetables:  $\chi^2 = 22.271$ ,  $df = 24$ ,  $\chi^2/df = 0.93$ ,  $p = 0.563$ , RMSEA< 0.001, SRMR= 0.014, CFI= 1.000, TLI= 1.000, CD= 0.966.

### 2.5.2 Consumers' characteristics based on their perceived importance of food quality attributes

The previous part showed that intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging characteristics) are important and relevant in assessing purchase intentions towards high quality rice and safe vegetables. In this section, segmentation analyses were conducted based on the perceived importance of intrinsic and extrinsic attributes in the case of rice (Table 2.5) and vegetables (Table 2.6). In the case of rice, three segments were identified (Table 2.5). The first segment includes those who attributed high importance to both intrinsic and extrinsic aspects of rice. Consumers in this segment are referred to as “Both intrinsic and extrinsic are of high importance R” consumers. The second segment describes consumers who showed a high interest in intrinsic aspects and a medium interest in extrinsic aspects of rice. Consumers in this segment are the “Intrinsic is important and extrinsic is medium important R” consumers. The third segment illustrates consumers who had a low interest in extrinsic aspects and still interest in intrinsic aspects of rice. These consumers are referred to as the “Extrinsic is less important and intrinsic is important R” consumers. In the case of vegetables, three segments were identified (Table 2.6) namely “Both intrinsic and extrinsic are important V” consumers, “Intrinsic is important and extrinsic is medium important V” consumers, and “Extrinsic is less important and intrinsic is important V” consumers.

Table 2.5. Segmentation of consumers based on the perceived importance of rice attributes  
(n=496, June-July 2015)

	Both intrinsic and extrinsic are of high importance R (n=180)	Intrinsic is important and extrinsic is medium important R (n=188)	Extrinsic is less important and intrinsic is important R (n=128)	F	p-value
Intrinsic R	4.78	4.46	4.31	29.96	<0.001
Extrinsic R	4.53	3.41	1.91	1253.06	<0.001

R: Rice

Table 2.6. Segmentation of consumers based on the perceived importance of vegetables  
attributes (n=493, June-July 2015)

	Both intrinsic and extrinsic are important V (n=182)	Intrinsic is important and extrinsic is medium important V (n=205)	Extrinsic is less important and intrinsic is important V (n=106)	F	p-value
Intrinsic V	4.82	4.43	4.33	43.71	<0.001
Extrinsic V	4.38	3.41	1.82	1247.78	<0.001

V: Vegetables

The associations between cluster for rice and cluster for vegetables were performed (Table 2.7). The significant value of chi-square association test confirmed that there was a strong association between the two clusters. This implies that our results are consistent whether they are based on rice or vegetables.

Table 2.7. Association between consumer segments for rice and vegetables (%)  
(June-July 2015)

	Total (n=489)	Extrinsic is less important and intrinsic is important R (n=127)	Intrinsic is important and extrinsic is medium important R (n=186)	Both intrinsic and extrinsic are of high importance R (n=176)	Chi- square	p-value
Extrinsic is less important and intrinsic is important V (n=104)	21.3	49.6	15.6	6.8	159.51	<0.001
Intrinsic is important and extrinsic is medium important V (n=204)	41.7	42.5	55.4	26.7		
Both intrinsic and extrinsic are important V (n=181)	37.0	7.9	29.0	66.5		

R: Rice, V: Vegetables

Consumer segments in the case of rice were further profiled on their use (Table 2.8) and trust (Table 2.9) in different sources of information when purchasing food. Information from supermarket was used more frequently by the “Both intrinsic and extrinsic are of high importance R” consumers, followed by the “Intrinsic is important and extrinsic is medium important R” consumers, and finally by the “Extrinsic is less important and intrinsic is important R” consumers. The latter two segments used information from the Internet, TV, advertising, family and friends, and on food package less often in comparison to the first segment. The “Both intrinsic and extrinsic are of high importance R” consumers used information from experts more frequently than the other two segments.



Table 2.8. Rice consumer segments and their use of information sources when buying food (n=496, June-July 2015)

Use information from [...]	Total (n=496)	Both intrinsic and extrinsic are of high importance R (n=180)	Intrinsic is important and extrinsic is medium important R (n=188)	Extrinsic is less important and intrinsic is important R (n=128)	F	p-value
Supermarket	4.52 (1.29)	4.92 <sup>d</sup> (1.00)	4.48 <sup>e</sup> (1.21)	4.02 <sup>f</sup> (1.56)	19.78	<0.001
The Internet	3.25 (1.88)	3.66 <sup>a</sup> (1.83)	3.14 <sup>b</sup> (1.86)	2.84 <sup>b</sup> (1.88)	7.81	<0.001
TV	4.26 (1.56)	4.61 <sup>d</sup> (1.42)	4.26 <sup>d</sup> (1.51)	3.79 <sup>e</sup> (1.70)	10.68	<0.001
Radio	2.14 (1.40)	2.35 <sup>d</sup> (1.46)	2.07 <sup>d,e</sup> (1.33)	1.93 <sup>e</sup> (1.38)	3.76	0.024
Advertising	3.89 (1.53)	4.30 <sup>d</sup> (1.43)	3.79 <sup>e</sup> (1.49)	3.46 <sup>e</sup> (1.59)	12.52	<0.001
The government	2.92 (1.54)	3.33 <sup>a</sup> (1.49)	2.82 <sup>b</sup> (1.48)	2.48 <sup>b</sup> (1.58)	12.34	<0.001
Consumer organisation	2.68 (1.51)	2.98 <sup>a</sup> (1.54)	2.68 <sup>a,b</sup> (1.44)	2.27 <sup>b</sup> (1.51)	8.47	<0.001
Family and friends	4.52 (1.37)	4.94 <sup>d</sup> (1.13)	4.50 <sup>e</sup> (1.28)	3.95 <sup>f</sup> (1.57)	20.94	<0.001
Experts	3.02 (1.68)	3.48 <sup>a</sup> (1.68)	2.85 <sup>b</sup> (1.66)	2.61 <sup>b</sup> (1.56)	12.08	<0.001
Local market sellers	3.94 (1.55)	4.12 (1.44)	3.82 (1.60)	3.83 (1.60)	2.07	0.127
Food industry	3.05 (1.52)	3.34 <sup>a</sup> (1.48)	2.87 <sup>b</sup> (1.50)	2.92 <sup>b</sup> (1.55)	5.20	0.006
On food package	3.93 (1.53)	4.25 <sup>d</sup> (1.43)	3.91 <sup>d,e</sup> (1.46)	3.49 <sup>e</sup> (1.68)	9.52	<0.001

Standard deviations are in the parentheses

<sup>a, b, c</sup> indicate significantly different means using Bonferroni Post hoc Test

<sup>d, e, f</sup> indicate significantly different means using Dunnett T3 Post hoc Test

R: Rice; Use of information sources was measured “never” (1) to “very frequently” (6)

Trust in different sources of information when buying food of different consumer segments (in the case of rice) was explored (Table 2.9). The “Both intrinsic and extrinsic are of high importance R” consumers tend to trust more in information from family and friends, and from food package than the other two segments.

Table 2.9. Rice consumer segments and their trust in different information sources when purchasing food (n=496, June-July 2015)

Trust in [...]	Total (n=496)	Both intrinsic and extrinsic are of high importance R (n=180)	Intrinsic is important and extrinsic is medium important R (n=188)	Extrinsic is less important and intrinsic is important R (n=128)	F	p-value
Supermarket	5.25 (1.26)	5.47 <sup>d</sup> (1.05)	5.23 <sup>d,e</sup> (1.21)	4.98 <sup>e</sup> (1.52)	5.83	0.003
The Internet	3.86 (1.65)	4.22 <sup>d</sup> (1.52)	3.74 <sup>e</sup> (1.67)	3.54 <sup>e</sup> (1.70)	7.51	0.001
TV	4.75 (1.58)	4.92 (1.44)	4.69 (1.55)	4.58 (1.77)	1.95	0.143
Radio	3.57 (1.69)	3.69 (1.62)	3.47 (1.76)	3.54 (1.67)	0.83	0.435
Advertising	3.95 (1.55)	4.15 (1.50)	3.79 (1.52)	3.90 (1.66)	2.55	0.079
The government	5.12 (1.45)	5.40 <sup>a</sup> (1.38)	4.99 <sup>b</sup> (1.51)	4.91 <sup>b</sup> (1.38)	5.50	0.004
Consumer organisation	4.76 (1.54)	5.09 <sup>a</sup> (1.51)	4.56 <sup>b</sup> (1.62)	4.61 <sup>b</sup> (1.40)	6.40	0.002
Family and friends	5.50 (1.24)	5.77 <sup>d</sup> (1.08)	5.41 <sup>e</sup> (1.33)	5.26 <sup>e</sup> (1.27)	7.48	0.001
Experts	5.17 (1.66)	5.44 <sup>a</sup> (1.57)	5.07 <sup>a,b</sup> (1.73)	4.93 <sup>b</sup> (1.64)	4.02	0.019
Local market sellers	3.91 (1.53)	4.06 (1.47)	3.81 (1.59)	3.85 (1.53)	1.33	0.267
Food industry	4.25 (1.61)	4.62 <sup>a</sup> (1.56)	4.03 <sup>b</sup> (1.60)	4.05 <sup>b</sup> (1.60)	7.64	0.001
On food package	4.54 (1.52)	4.93 <sup>d</sup> (1.26)	4.38 <sup>e</sup> (1.63)	4.22 <sup>e</sup> (1.58)	9.90	<0.001

Standard deviations are in the parentheses

<sup>a, b, c</sup> indicate significantly different means using Bonferroni Post hoc Test

<sup>d, e, f</sup> indicate significantly different means using Dunnett T3 Post hoc Test

R: Rice; Trust in information sources was measured from “completely distrust” (1) to “completely trust” (7)

The socio-economic characteristics of consumer segments (in the case of rice) were explored (Table 2.10). The “Both intrinsic and extrinsic are of high importance R” consumers tend to have higher education than the “Extrinsic is less important and intrinsic is important R” consumers.

Table 2.10. Socio-economic characteristics for rice consumer segments  
(n=496, June-July 2015)

	Total (n=496)	Both intrinsic and extrinsic are of high importance R (n=180)	Intrinsic is important and extrinsic is medium important R (n=188)	Extrinsic is less important and intrinsic is important R (n=128)	F	p-value
Age (years)	40.56 (11.61)	40.29 (11.40)	40.34 (11.89)	41.27 (11.53)	0.32	0.724
Education	3.41 (1.31)	3.61 <sup>a</sup> (1.24)	3.43 <sup>ab</sup> (1.31)	3.09 <sup>b</sup> (1.33)	6.11	0.002
Income (self- reported)	4.16 (0.79)	4.24 (0.73)	4.13 (0.83)	4.09 (0.80)	1.69	0.185

Standard deviations are in the parentheses

<sup>a, b, c</sup> indicate significantly different means using Bonferroni Post hoc Test

<sup>d, e, f</sup> indicate significantly different means using Dunnett T3 Post hoc Test

R: Rice; Education was measured from “Elementary school” (1) to “University and upper” (5), Income was measured from “very difficult” (1) to “well-off” (6)

Differences between consumer segments in the case of vegetables were explored on their use (Table 2.11) and trust (Table 2.12) in various sources of information when buying food. Information from supermarket, advertising, family and friends, and on food package were used more often by the “Both intrinsic and extrinsic are important V” consumers and the “Intrinsic is important and extrinsic is medium important V” consumers, than the “Extrinsic is less important and intrinsic is important V” consumers.

Table 2.11. Vegetables consumer segments and their use of information sources when buying food (n=493, June-July 2015)

Use information from [...]	Total (n=493)	Both intrinsic and extrinsic are important V (n=182)	Intrinsic is important and extrinsic is medium important V (n=205)	Extrinsic is less important and intrinsic is important V (n=106)	F	p-value
Supermarket	4.51 (1.29)	4.85 <sup>d</sup> (1.06)	4.53 <sup>e</sup> (1.17)	3.87 <sup>f</sup> (1.60)	21.00	<0.001
The Internet	3.25 (1.88)	3.65 <sup>a</sup> (1.84)	3.28 <sup>a</sup> (1.86)	2.48 <sup>b</sup> (1.76)	13.80	<0.001
TV	4.23 (1.56)	4.32 (1.54)	4.32 (1.50)	3.92 (1.68)	2.67	0.070
Radio	2.11 (1.38)	2.44 <sup>d</sup> (1.50)	1.99 <sup>e</sup> (1.29)	1.79 <sup>e</sup> (1.22)	9.16	<0.001
Advertising	3.89 (1.53)	4.15 <sup>d</sup> (1.52)	3.85 <sup>d,e</sup> (1.43)	3.50 <sup>e</sup> (1.64)	6.26	0.002
The government	2.91 (1.54)	3.23 <sup>a</sup> (1.56)	2.92 <sup>a</sup> (1.46)	2.34 <sup>b</sup> (1.50)	11.61	<0.001
Consumer organisation	2.67 (1.50)	2.92 <sup>a</sup> (1.55)	2.69 <sup>a</sup> (1.46)	2.20 <sup>b</sup> (1.41)	8.03	<0.001
Family and friends	4.51 (1.37)	4.76 <sup>d</sup> (1.26)	4.53 <sup>d</sup> (1.20)	4.04 <sup>e</sup> (1.71)	9.52	<0.001
Experts	3.02 (1.68)	3.27 <sup>a</sup> (1.77)	2.98 <sup>a,b</sup> (1.62)	2.66 <sup>b</sup> (1.59)	4.55	0.011
Local market sellers	3.94 (1.55)	4.18 <sup>d</sup> (1.48)	3.86 <sup>d,e</sup> (1.45)	3.67 <sup>e</sup> (1.78)	4.16	0.016
Food industry	3.06 (1.52)	3.29 <sup>a</sup> (1.48)	3.07 <sup>a</sup> (1.53)	2.62 <sup>b</sup> (1.48)	6.58	0.002
On food package	3.92 (1.53)	4.28 <sup>d</sup> (1.45)	3.94 <sup>d</sup> (1.42)	3.27 <sup>e</sup> (1.66)	15.33	<0.001

Standard deviations are in the parentheses

<sup>a, b, c</sup> indicate significantly different means using Bonferroni Post hoc Test

<sup>d, e, f</sup> indicate significantly different means using Dunnett T3 Post hoc Test

V: Vegetables; Use of information sources was measured “never” (1) to “very frequently” (6)

Differences between consumer segments (in the case of vegetables) were explored on their trust in various sources of information when buying food (Table 2.12). The “Extrinsic is less important and intrinsic is important V” consumers were less likely trust in information from supermarket, and food package than the “Both intrinsic and extrinsic are important V” consumers.

Table 2.12. Vegetables consumer segments and their trust in information sources when buying food (n=493, June-July 2015)

Trust in [...]	Total (n=493)	Both intrinsic and extrinsic are important V (n=182)	Intrinsic is important and extrinsic is medium important V (n=205)	Extrinsic is less important and intrinsic is important V (n=106)	F	p-value
Supermarket	5.25 (1.25)	5.44 <sup>d</sup> (1.04)	5.25 <sup>d,e</sup> (1.23)	4.93 <sup>e</sup> (1.54)	5.54	0.004
The Internet	3.86 (1.65)	4.10 <sup>a</sup> (1.64)	3.84 <sup>a,b</sup> (1.61)	3.48 <sup>b</sup> (1.70)	4.82	0.008
TV	4.74 (1.58)	4.73 (1.59)	4.80 (1.44)	4.63 (1.80)	0.42	0.656
Radio	3.56 (1.68)	3.66 (1.71)	3.50 (1.66)	3.50 (1.67)	0.53	0.592
Advertising	3.94 (1.55)	3.98 (1.50)	3.92 (1.51)	3.90 (1.70)	0.14	0.873
The government	5.11 (1.45)	5.34 <sup>a</sup> (1.39)	5.06 <sup>a,b</sup> (1.44)	4.84 <sup>b</sup> (1.53)	4.17	0.016
Consumer organisation	4.75 (1.54)	4.99 <sup>a</sup> (1.55)	4.74 <sup>a,b</sup> (1.50)	4.38 <sup>b</sup> (1.55)	5.34	0.005
Family and friends	5.49 (1.24)	5.73 <sup>d</sup> (1.08)	5.37 <sup>e</sup> (1.24)	5.33 <sup>e</sup> (1.44)	5.14	0.006
Experts	5.16 (1.66)	5.41 <sup>d</sup> (1.50)	5.18 <sup>d,e</sup> (1.68)	4.71 <sup>e</sup> (1.79)	6.09	0.002
Local market sellers	3.90 (1.52)	4.07 (1.46)	3.80 (1.52)	3.80 (1.63)	1.72	0.181
Food industry	4.24 (1.60)	4.55 <sup>a</sup> (1.51)	4.15 <sup>b</sup> (1.62)	3.89 <sup>b</sup> (1.64)	6.41	0.002
On food package	4.53 (1.51)	4.81 <sup>d</sup> (1.31)	4.55 <sup>d</sup> (1.53)	4.01 <sup>e</sup> (1.68)	9.75	<0.001

Standard deviations are in the parentheses

<sup>a, b, c</sup> indicate significantly different means using Bonferroni Post hoc Test

<sup>d, e, f</sup> indicate significantly different means using Dunnett T3 Post hoc Test

V: Vegetables; Trust in information sources was measured from “completely distrust” (1) to “completely trust” (7).

The socio-economic characteristics of different consumer segments (in the case of vegetables) were illustrated (Table 2.13). The “Extrinsic is less important and intrinsic is important V” consumers were likely older, had lower education level and income than the other two segments.

Table 2.13. Socio-economic characteristics for vegetables consumer segments (n=493, June-July 2015)

	Total (n=493)	Both intrinsic and extrinsic are important V (n=182)	Intrinsic is important and extrinsic is medium important V (n=205)	Extrinsic is less important and intrinsic is important V (n=106)	F	p-value
Age (years)	40.45 (11.55)	39.23 <sup>a</sup> (11.07)	39.79 <sup>a</sup> (11.48)	43.81 <sup>b</sup> (11.93)	5.96	0.003
Education	3.41 (1.31)	3.59 <sup>a</sup> (1.22)	3.51 <sup>a</sup> (1.27)	2.90 <sup>b</sup> (1.40)	10.97	<0.001
Income (self-reported)	4.15 (0.80)	4.20 <sup>a</sup> (0.73)	4.20 <sup>a</sup> (0.81)	3.96 <sup>b</sup> (0.86)	3.89	0.021

Standard deviations are in the parentheses

<sup>a, b, c</sup> indicate significantly different means using Bonferroni Post hoc Test

<sup>d, e, f</sup> indicate significantly different means using Dunnett T3 Post hoc Test

V: Vegetables; Education was measured from “Elementary school” (1) to “University and upper” (5), Income was measured from “very difficult” (1) to “well-off” (6)

The link between use and trust in different information sources is illustrated in Table 2.14.

Table 2.14. The link between use and trust in different information sources

Use information (n=487)	Mean (SD)	Rank	Trust (n=472)	Mean (SD)	Rank
Family and friends	4.52 (1.36)	1	Family and friends	5.50 (1.24)	1
Supermarket	4.51 (1.29)	2	Supermarket	5.26 (1.25)	2
TV	4.25 (1.56)	3	TV	4.75 (1.57)	5 - 6
Local market sellers	3.93 (1.55)	4 - 5	Local market sellers	3.91 (1.53)	10
On package	3.93 (1.53)	4 - 5	On package	4.54 (1.51)	7
Advertising	3.89 (1.52)	6	Advertising	3.95 (1.55)	9
Internet	3.25 (1.88)	7	Internet	3.87 (1.65)	11
Food industry	3.05 (1.51)	8	Food industry	4.26 (1.60)	8
Experts	3.03 (1.68)	9	Experts	5.17 (1.66)	3
Government	2.92 (1.54)	10	Government	5.12 (1.44)	4
Consumer organization	2.68 (1.51)	11	Consumer organization	4.77 (1.54)	5 - 6
Radio	2.13 (1.39)	12	Radio	3.58 (1.69)	12

Use of information sources was measured “never” (1) to “very frequently” (6).

Trust in information sources was measured from “completely distrust” (1) to “completely trust” (7).

Consumers tend to use information from family and friends, supermarket, TV, local market sellers, and on food package relatively often. In addition, advertising and the Internet (e.g. social media, online newspapers) are also important sources of information that consumers use when purchasing food. In terms of consumers trust in different information sources, they tend to trust

in family and friends, supermarket the most. While they use information from local market sellers relatively often, they do not tend to trust in this source. Similarly, consumers do not tend to trust in information from advertising and the Internet. Information from food package were used and trusted at a medium level. While consumers do not often use the information from experts and the government, they tend to trust in these sources of information while purchasing food.

## **2.6 Discussion**

### *2.6.1 Discussion of the associations between consumers' perceived importance of food quality attributes and their purchase intentions*

This chapter investigates the associations between consumers' perceived importance of food quality attributes and their purchase intentions towards high quality rice and safe vegetables. Results of the study highlighted that the perceived importance of intrinsic attributes (safety, quality, health, trustworthiness) is directly and positively associated with purchase intentions towards high quality rice and safe vegetables which is consistent with the literature (Dowd & Burke, 2013; Slamet et al., 2016; Teng et al., 2011; Wee et al., 2014; Yin et al., 2010). This implies that consumers who show more concern about the intrinsic aspects of rice and vegetables have higher purchase intentions towards high quality rice and safe vegetables. These results suggested that the perceived importance of intrinsic attributes (safety, quality, health, trustworthiness) of rice and vegetables, are of high importance in consumers' purchase intentions towards food with quality labels.

An implication for producers is to improve the intrinsic aspects (safety, quality, health, trustworthiness) of high quality rice and safe vegetables. Results of this study showed that food safety is one of the important intrinsic attributes that contributes to positively influence purchase intention towards food with quality labels. Also as indicated in the introduction of Chapter 1, food safety is a major concern in Vietnam (Chau et al., 2014; Ha et al., 2008; Hung et al., 2017; Le et al., 2017; VFA, 2000-2012; World Bank, 2016a). Hence, producers are encouraged to improve the food safety aspects for their product, for example, by applying safe production methods to guarantee the safety aspects of the products. Health is another important intrinsic aspect that contributes to positively influence purchase intention towards food with quality labels. It is observed that there is an increasing interest in the health aspect of food with quality labels in Vietnam. Therefore, producers are also encouraged to invest in products that contain health benefits. In addition, intrinsic aspects considered in this study include not only

health value, quality and safety aspects, but also perceived trustworthiness of the product itself. Therefore, producers and marketers should invest in increasing the credibility of the product to improve the perceived trustworthiness of the product itself and encourage higher purchase intention towards quality food.

The study showed that the perceived importance of extrinsic attributes (product labelling and packaging) is directly and positively associated with purchase intentions towards high quality rice and safe vegetables. These results were in line with the literature (Farah et al., 2011; Ibitoye et al., 2014; Jeddi & Zaiem, 2010; Sakar et al., 2015; Schnettler et al., 2008). This confirms that extrinsic aspects (product labelling and packaging attributes) are important in supporting consumers' choices towards quality food products such as high quality rice and safe vegetables. This result also highlighted the important roles of extrinsic attributes, such as labelling attributes, in additional research efforts to better understand consumers' attitudes and behaviour towards food with quality labels in the Vietnamese food market. With increasing income and rapid urbanisation, consumers do not only demand for food that are of high quality and safe but also being guaranteed by trustworthy organisations. Food label-related aspects play an important role in transferring the guarantee information and visualising the information to consumers through labels and packages.

Noticeably, the coefficient of extrinsic attributes (product labelling and packaging) in the model of high quality rice was smaller than and not highly significant in comparison to the coefficient of extrinsic attributes (product labelling and packaging) in the model of safe vegetables (Table 2.4). This indicates that there is more room to improve the extrinsic attributes (product labelling and packaging) of quality rice which can contribute to increasing consumers' purchase intention towards high quality rice. This result is consistent with the current situation of product labelling and packaging of rice and vegetables on the market in recent years. It is observed that rice and vegetables are commonly sold in traditional market without labelling or packaging, or without detailed information on the label. However, in the supermarkets, vegetables are relatively more frequently sold under some quality standards such as VietGAP. Also, many vegetables and fruit sold in supermarkets indicate product origin. In supermarkets, some certain rice products have labels that indicate quality assurances, however, in many cases, the information on the rice labels is, in general, insufficient and improperly presented. In addition, there are still many rice products in markets that do not have detailed information on the label such as information about quality certification, producer (origin), date of manufacture and expiration date.



Results showed that packaging is one of the important aspects that producers should take into account during production. Packaging can contribute to keeping rice in a good condition (e.g. ensuring safety, preserving its fragrance and aroma, prevention of loss and deterioration from transportation and distribution, increasing product shelf life), providing instructions for preparation and cooking, and also providing supplementary information, for example, about quality assurances. Also, it is observed that many consumers in urban areas are gradually changing their purchase towards rice that is pre-packed. Hence, it is recommended to use packaging for quality rice and include adequate information on the label and package. However, it is suggested to use more environmentally friendly packaging materials in the product strategy for rice, for example, biodegradable materials (Khaosaeng et al., 2012). This will contribute to improving the labelling aspects for quality rice and also contribute to protecting the environment.

However, the use of packaging can be flexible. For example, in the case of vegetables and fruit, some consumers may have preference in selecting the product themselves and the volume purchased may be different (for example, they may not like all items in the pre-packed food bag and may not want to buy a full 1kg of pre-packed food products). Also, they may prefer that the products are guaranteed with quality standards. In this case, it is suggested to provide notification at the selling area that the product is guaranteed with the standard, and leave the choice for consumers to choose between packed or un-packed products according to their preferences. Thus, depending on the products and consumers preferences, the retailers may offer both packed products with quality standards, and un-packed products with quality standards according to the diverse preferences of consumers.

The finding that extrinsic attributes (product labelling and packaging) are important in consumers' food choices provides implications for producers, marketers and policymakers in terms of developing a food quality labelling system in Vietnam. At the policymakers' level, it is important to develop a food quality certification system that is credible, trustworthy, transparent, and with affordable cost (e.g. accreditation cost) for producers. At the producers' level, they are encouraged to invest more in concretising information on the product label and applying for credible quality assurances to increase the credibility of their products.

### *2.6.2 Discussion of the segmentation results*

The segmentation analyses for rice and vegetables showed that there are different consumer segments in terms of their perceived importance of food attributes. The first consumer segment includes those who have a high focus on both intrinsic and extrinsic attributes of food. The

second segment has a high focus on intrinsic aspects and a moderate focus on extrinsic aspects. The third segment has a low interest in extrinsic aspects and still a moderate interest in intrinsic aspects. Based on their use and trust in different information sources, these consumer segments can be reached by different targeted communication strategies. This also depends on which consumer segment that the company chooses to target. In the case of rice, for consumers who attributed high importance to both intrinsic and extrinsic attributes, they tend to use information from family and friends, supermarket, TV, on food package. They also seem to trust in information from supermarket, and food package. Thus, to reach this consumer segment, producers and marketers can communicate via supermarket and food package. Similar strategy can be used to reach the second consumer segment who shows a high-moderate interest in intrinsic attributes and a moderate interest in extrinsic attributes. Noticeably, the second consumer segment has a moderate interest in extrinsic attributes and the third consumer segment has a low interest in extrinsic attributes. This could be because these two consumer segments (in the case of both rice and vegetables) may not be aware, understand and know how to use the information on the food package to assist them in their purchasing decision. These consumer segments (in the case of both rice (Table 2.10) and vegetables (Table 2.13)) tend to have a little lower education level compared to the first segment. Hence, more efforts to encourage and demonstrate the benefits of using and understanding the information on food label and package can be made to these segments. This can contribute to increasing their appreciation for the product via understanding the information on food label and package. Similar implications can be made for vegetable consumer segments.

### *2.6.3 Discussion of the use and trust in different information sources and the links between them*

Communication of the intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) can be reached consumers via different sources of information such as supermarket, TV, advertising, on food package as consumers tend to use these sources of information relatively often when purchasing food (Table 2.14). Supermarket was reported to play an important role in providing food under quality labels in the Vietnamese food market due to various reasons including growing food safety concerns (Reardon et al., 2012). Noticeably, communication via supermarkets is promising, as supermarkets, a distribution channel, can simultaneously play the roles of a service channel and also a communication channel (West et al., 2015). Thus, marketers should take this into account when doing marketing efforts for food with quality labels. Further collaboration between the upstream

and downstream supply chain of quality food is highly encouraged. Producers and marketers could consider to set up further collaboration with retailers, such as supermarkets, in terms of building credible food quality labels, which can contribute to generating long term benefits to producers, retailers and consumers. Noticeably, during the survey, it is observed that many consumers thought that most food products that are sold in supermarkets are of high quality which is not always true. Thus, there is a need to regulate the credibility and transparency of information of quality foods that are sold in supermarkets. Food products that are produced under quality labels, and are guaranteed by credible organisations, and sold in supermarkets, should be clearly communicated to consumers to avoid misleading information.

In addition to supermarket channel, intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) of quality foods can also be communicated via advertising. Based on the results from Table 2.14, advertising is also used as a source of information when consumers purchasing food, although trust in advertising is not high. However, one should keep in mind that advertising always has pros and cons. On the one hand, advertising can effectively support consumers' food choices if relevant and credible information is provided regarding search, experience, or credence attributes. Nevertheless, advertising may also cause confusing and may increase search and information costs to consumers when misleading or untrustworthy information is presented. Since the aim of producers is to use advertising to sell as much products as possible (Nelson, 1974), it is important to regulate and control the message credibility being provided to consumers in order to increase consumers' trust in the product.

#### *Discussion of the link between use and trust in different information sources*

Exploring the link between use and trust in different information sources (Table 2.14) provides some important implications. Supermarket was found as an important source of information that consumers use and trust when purchasing food (Table 2.14). This indicates the strong role of supermarket as a source of information and as a trusted party. It is estimated that there is about 16% of people purchase packaged rice only in Vietnam (Custodio et al., 2018). Also the proportion of those who only purchase rice at the modern retailers is currently very small compared to traditional retailers (Custodio et al., 2018). Hence, although the current purchase of rice and vegetables at the supermarket is not high compared to traditional market. However, with rapid urbanisation and increasing income of consumers in urban areas in Vietnam in recent years, there is an increasing demand for food with quality labels including those for rice and vegetables. Importantly, results showed that on average supermarket is one of the most used

and trusted information sources when consumers purchase food. Thus, supermarkets may play a very important role in providing food with quality labels to consumers. Also, supermarkets should improve and demonstrate themselves as a trustworthy information source that consumers can refer to when purchasing food.

In addition, there is more room to improve consumers use and trust in information from food package (food labelling) as the current use and trust in this information source is not yet high (Table 2.14). The government should provide more detailed regulations on food labelling information while the private firms should provide credible information on food label and package in order to increase consumers' trust in this information source. While consumers tend to trust in information from experts and the government when buying food, the current use of information sources from experts and government is not high (Table 2.14). Hence, there is potential room to improve consumers' use of information sources from experts and the government for food purchase.

#### *2.6.4 Discussion of the important role of supermarket in supplying food with quality labels*

There is a discussion that if supermarkets play a dominant role in the market in terms of supplying food with quality labels, they may charge consumers high prices. This issue needs more discussion. Depending on the competitiveness of supermarkets in each country, the situation may be different. In Vietnam, there are relatively many supermarkets in the same urban area, specifically in big cities. Thus the supermarkets themselves should have good pricing policy in order to compete with each other. In addition, the government also has the mechanism to monitor and control the pricing policy for food products in the markets. For example, the government has the price stabilisation policy for basic goods (including conventional rice) in the market, namely The "Law on Price" Law No. 11/2012/QH13 issued by the National Congress of the Communist Party of Vietnam in 2012 (National Congress of the Communist Party of Vietnam, 2012). However, in recent years, with the emerging of good agricultural practices products, the government also has the policy to encourage the supermarkets in terms of selling quality products at correct prices (i.e. not charge high prices) to consumers. The aim of the government is to motivate primary producers to engage in good agricultural practices, connect producers of good agricultural practices to the retailers, and encourage the retailers to sell quality food (e.g. food with GAP labels) at affordable price to consumers. Finally, consumers nowadays are intelligent in making their food choices. If the supermarkets charge too high prices, consumers will not buy the products. This will lead to the consequences that the supermarkets cannot sell the products. Thus, if the supermarkets would

want to gain benefit in the long term from selling food with quality labels, they must have the strategy to sell products at correct prices without charging consumers high prices. This will help them to increase their competitiveness with other supermarkets and to maintain their customers by providing products at reasonable prices.

#### *2.6.5 Discussion of the need of unified logos for sustainable production practices*

Currently, there is unclear and inappropriate information provision on food labels (in both cases of rice and vegetables) in Vietnam. In addition, consumers find it difficult to recognise VietGAP products, which may result from the fact that there is no unified logo. Therefore, it is important to provide selective and relevant signals on the food with quality labels (in the case of both rice and vegetables). This can be done via building and communicating a unique and credible image or logo for food with quality labels that contains key attributes of the certified production processes. For example, as McFadden and Huffman (2017) indicated, the USDA organic logo has been established as a meaningful food label that represents the characteristics of organic production methods without mentioning the entire production process. This can make significant contributions to increasing consumers' trust as well as promoting the label effectively. Thus, it is highly recommended to establish official and unified signals (logos) for the national good agricultural practices standard (VietGAP) and for a national organic standard.

Evolving to one unified logo, for example, for VietGAP, which contains key attributes of VietGAP production processes in a meaningful and simple form to be easily recognised and remembered, is highly recommended. This quality signal (logo) should be able to signal good quality, have the ability to communicate key attributes of quality standards (e.g. the meaning of quality assurance, traceability information) effectively (i.e. meaningful, relevant, selective messages) to consumers, and demonstrate its own trustworthiness. This meaningful logo should then be communicated to consumers to increase consumers' familiarity with this certification, effectively support them in terms of identifying food with quality labels (enhance their self-competence) and increase consumers' trust in the products and in the labelling system.

This study has some limitations. The study sample is limited to consumers who live in two large Vietnamese cities which limits generalisation of the results to the overall Vietnamese population. Its sample was biased towards more females as females are typically the main food shoppers for households in Vietnam. The limitations associated with sampling are discussed in further detail in Chapter 7 of the thesis. The questionnaire completed by respondents was self-reported, thus may suffer, to some extent, from social desirability bias. Further discussion of

the limitations associated with self-reported measures is illustrated in detail in Chapter 7 of the thesis. Future research using methods that can account for these limitations is recommended.

## **2.7 Conclusion**

This study investigates the associations between consumers' perceived importance of food quality attributes and their purchase intentions towards high quality rice and safe vegetables. Results highlighted that the perceived importance of intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) are directly and positively associated with consumers' purchase intentions towards high quality rice and safe vegetables. Communications focusing on intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) are recommended to increase consumers' purchase intentions towards high quality rice and safe vegetables. Furthermore, communication of information about food quality labels via different channels such as supermarket, TV, advertising are promising to reach consumers. As supermarket may play a market leader role in providing food under quality labels in many developing countries including Vietnam, labelling information on food products that are sold in markets, particularly in supermarkets, should be properly regulated and controlled to enhance consumers' trust in the food quality labels.

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## **Part Three.**

# **Attitudes and behaviour towards food with quality labels**

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In the previous part, Chapter 2 showed the importance of intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) in additional research efforts to understand consumers' attitudes and behaviour towards food with quality labels in Vietnam. In Part Three, consumers' attitudes (Chapter 3) and purchase behaviour (Chapter 4) towards food with quality labels (quality-certified food, or food with extrinsic credence attributes) were investigated. More specifically, Chapter 3 investigates consumers' familiarity with, attitudes towards quality-certified foods, and possible food choice motives. In addition, Chapter 3 investigates the associations between consumers' food choice motives and their attitudes (affective factors) towards quality-certified foods. In Chapter 4, factors that affect consumers' purchase behaviour (conative and behavioural factors) towards quality-certified foods were investigated.





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## Chapter 3. Familiarity with, and attitudes towards, food with quality labels

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Chapter 2 showed that perceived importance of product attributes including intrinsic and extrinsic aspects (cognitive factors) are important in consumers' food choices. This chapter (Chapter 3) further explores consumers' familiarity with different food quality certifications (cognitive factors) in the Vietnamese food market. Importantly, Chapter 3 investigates the associations between consumers' food choice motives and their attitudes (affective factors) towards quality-certified foods.

This chapter investigates the following research questions:

RQ3. To what extent are consumers aware of food quality-related terms?

RQ4. To what extent are consumers familiar with different food quality certifications in the Vietnamese food market? What are the characteristics of consumers who are familiar and unfamiliar with food quality certifications?

RQ5. What is the association between consumers' food choice motives and their attitudes towards quality-certified foods?

Hypotheses:

Consumers who are familiar with food quality certifications have better knowledge of food quality-related terms, higher motivations, more positive attitudes towards food with quality labels than those who are unfamiliar with food quality certifications.

Consumers' food choice motives such as consumers' perceived importance of environmentally friendly behaviour relating to the purchase of quality food, food safety concern, and consumers' perceived importance of food for healthy eating are positively associated with the general attitudes towards quality-certified foods.

This chapter is based on: **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.



### 3.1 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.

**Keywords:** Attitude; Certification; Consumer; Food; Quality; Rice; Safety; Vegetables; Vietnam

### 3.2 Introduction

#### 3.2.1 Study background

Attention to food quality and safety is increasing in developing countries (Aung & Chang, 2014; Grunert et al., 2015; Jia & Jukes, 2013) driven by economic development, urbanisation, 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 et al., 2016; Thøgersen et al., 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; Nougadère et al., 2014; Reisch et al., 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 et al., 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 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 et al., 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 (De Koning et al., 2015; Thong et al., 2017; Van Loo et al., 2017). The Vietnamese Mekong Delta (MKD) in the South of Vietnam has been known as the primary rice-producing area, as well as an important fruit- and vegetable-supply region for the country. The important contributions of the MKD in the national and global food security as well as the challenges in agricultural production in the MKD (i.e. potential negative impacts of climate change and human activities on agricultural production) were illustrated in detail in Chapter 1 (the general introduction of the thesis). Based on the crucial roles of the MKD as well as the challenges that it faces in agricultural production, it is important to obtain more sustainable farming practices for food production such as rice production in the MKD (Berg et al., 2017; Demont & Rutsaert, 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 (Kireziova et al., 2015; Sonntag et al., 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 A2). The details of these quality certifications were presented in Chapter 1 (the general introduction of the thesis).

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.

### *3.2.2 Study scope and objectives*

The focus of this chapter 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 line with the scope of food quality, food safety, and sustainability concepts that were presented in Chapter 1 of the thesis, in this chapter (Chapter 3), 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. The concept of familiarity was presented in Chapter 1, section 1.2 the conceptual framework for the thesis. Previous studies found positive associations between consumers' attitudes and environmentally friendly food choice motives (Smith & Paladino, 2010; Voon et al., 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 et al., 2016; Michaelidou & Hassan, 2008). Food safety concern has a positive influence on the WTP for safe vegetables in Vietnam (Mergenthaler et al., 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. This issue has been indicated in the literature (Verbeke, 2005). This study focuses on urban consumers as these consumers are strongly concerned about food-related issues and show an increased demand for quality-labelled food in the context of Vietnam's fast economic growth and urbanisation (Mergenthaler et al., 2009; Wang et al., 2014). Rice and vegetables were selected

as the focal product categories because of different reasons that were described in detail in Chapter 1 (the general introduction of the thesis).

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 (FAO, 2014a), thus, rice production in the country makes an important contribution to global food security (Shrestha et al., 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 with 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 with quality labels in Vietnam are provided.

### **3.3 Materials and methods**

#### *3.3.1 Data collection*

Data collection and the characteristics of the sample were presented in detail in section 2.4.1 Chapter 2 of the thesis.

#### *3.3.2 Measures*

##### *3.3.2.1 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 A2).

### *3.3.2.2 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 other scores). 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.

### *3.3.2.3 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.

### *3.3.2.4 Purchase intention*

The measures of purchase intention has been mentioned in section 2.4.2 Chapter 2 of the thesis.

### *3.3.2.5 General attitude and potential determinants*

#### *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 et al., 2007; Pieniak et al., 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  $\alpha=0.89$ ).

### *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 from "1= totally disagree" to "7= totally agree" (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 et al., 2008) (Cronbach's  $\alpha= 0.91$ ).

Adapted from Magnusson et al. (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  $\alpha= 0.86$ ).

### *3.3.3 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 methodology to perform and assess the structural equation model was mentioned in detail in Section 2.4.3, Chapter 2 of the thesis. Following Anderson and Gerbing (1988), a two-step analysis procedure with confirmatory factor analysis and structural equation model was performed (Section 2.4.3, Chapter 2). 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).

**3.4 Results**

*3.4.1 Food quality certifications: familiarity and awareness*

Vietnamese consumers’ familiarity with food quality certifications is shown in Figure 3.1. 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.

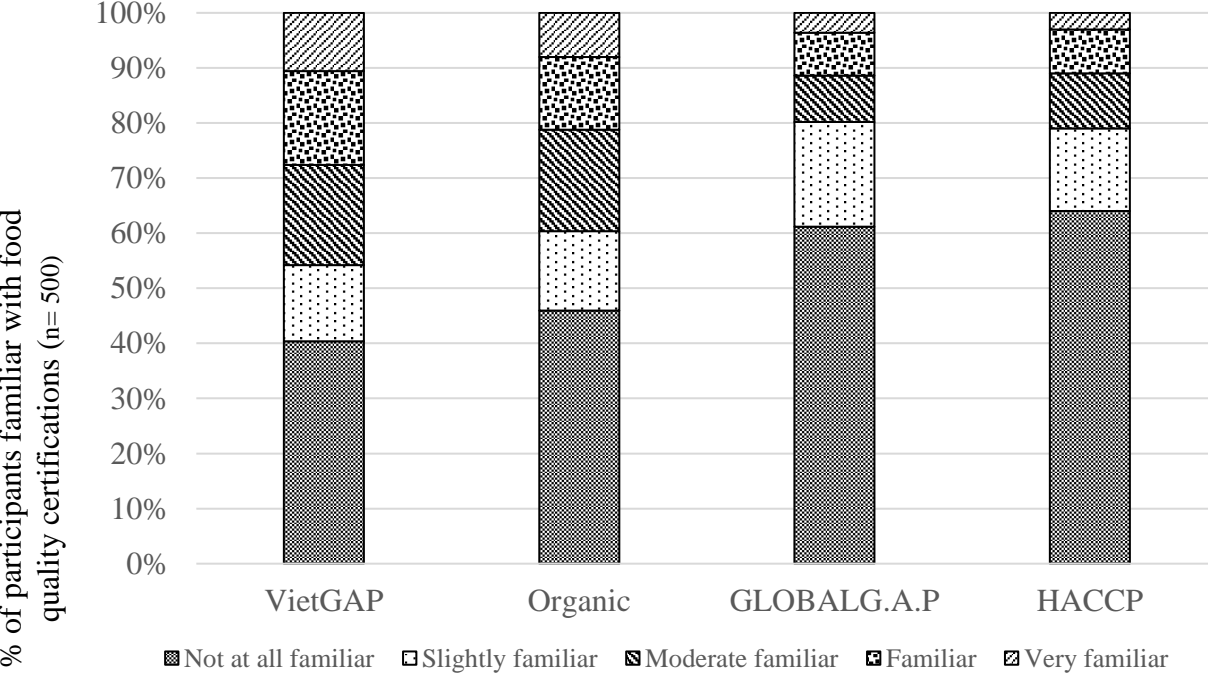


Figure 3.1. Consumers’ familiarity with food quality certifications (n=500, June-July 2015)

Consumers' awareness of food quality-related terms such as sustainability, GAP, food safety, and organic food is presented in Table 3.1. 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 3.1. 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.

Table 3.1. Awareness of food quality-related terms by familiarity with food quality certifications (% , n=500, June-July 2015)

Items	Total (n=500)	Unfamiliar with food quality certifications (n=146)	Familiar with food quality certifications (n=354)	Pearson Chi-Square	p- value
<b>Awareness of sustainability</b>				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		
<b>Awareness of good agricultural practice</b>				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		
<b>Awareness of food safety</b>				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		
<b>Awareness of organic food</b>				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		

Consumer characteristics for those familiar and unfamiliar with food quality certifications are reported in Table 3.2.

Table 3.2. Consumer characteristics based on familiarity with food quality certifications overall (% , unless specified otherwise, n=500, June-July 2015)

Items	Total	Unfamiliar with food quality certifications (n=146)	Familiar with food quality certifications (n=354)	Pearson Chi- Square/ t-value	p-value
<b>Mean age (years)</b>	40.5	43.12	39.46	3.232 <sup>a</sup>	0.002 <sup>a</sup>
<b>Age (years)</b>				4.785 <sup>b</sup>	0.091 <sup>b</sup>
<30	25.7	19.9	28.0		
30-50	52.3	53.4	51.8		
>50	22.0	26.7	20.1		
<b>Gender</b>				2.992 <sup>b</sup>	0.084 <sup>b</sup>
Male	16.8	12.3	18.7		
Female	83.2	87.7	81.3		
<b>Education</b>				45.828 <sup>b</sup>	<0.001 <sup>b</sup>
Basic education	51.1	74.7	41.4		
Higher education	48.9	25.3	58.6		
<b>Income (self-reported)</b>				29.182 <sup>b</sup>	<0.001 <sup>b</sup>
Low	12.8	21.9	9.1		
Medium	60.1	65.1	58.1		
High	27.1	13.0	32.9		
<b>Place of purchase</b>				75.154 <sup>b</sup>	<0.001 <sup>b</sup>
Supermarket	59.1	29.5	71.4		
Local market	40.9	70.5	28.6		
<b>Bag size of rice (kg)</b>				60.345 <sup>b</sup>	<0.001 <sup>b</sup>
0 – 10	25.6	2.1	35.4		
10 – 25	51.2	63.4	46.2		
> 25	23.1	34.5	18.4		
<b>Price of rice (VND per kg)</b>	15,015	13,171	15,790	-9.322 <sup>a</sup>	<0.001 <sup>a</sup>

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.

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 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 et al. (2012) reported that quality rice is often sold in supermarkets in small bags, for example, 5 kg per pack.

#### *3.4.2 Food quality certification (VietGAP) for vegetables*

VietGAP certification is the most popular and best known food 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 3.3).

Table 3.3. Consumer attitudes, food choice motives and behaviour towards vegetables by familiarity with VietGAP certification (n=500, June-July 2015)

Items	Unfamiliar with VietGAP certification (n=202)	Familiar with VietGAP certification (n=298)	t-value	p-value
Frequency of consuming safe vegetables	0.09 (0.03)	3.02 (0.16)	-18.263	<0.001
Purchase intention towards safe vegetables	4.00 (0.13)	5.95 (0.07)	-12.933	<0.001
Attitude towards safe vegetables	5.40 (0.07)	6.31 (0.05)	-10.744	<0.001
Perceived importance of environmental consequences relating to the purchase of safe vegetables	3.77 (0.05)	4.40 (0.04)	-9.786	<0.001
Perceived importance of vegetables for healthy eating	5.42 (0.06)	6.30 (0.04)	-12.402	<0.001
Food safety concern towards vegetables	5.22 (0.08)	6.13 (0.05)	-9.912	<0.001

Standard errors are in the parentheses. All constructs were measured from (1) to (7), except for “Frequency of consuming safe vegetables” and “Purchase intention towards safe vegetables” were measured from (0) to (7), “Perceived importance of environmental consequences relating to the purchase of safe vegetables” was from (1) to (5).

### 3.4.3 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 3.4). 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.

Table 3.4. Consumer attitudes, food choice motives, and behaviour towards rice by familiarity with HACCP (n=500, June-July 2015)

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 (0.25)	7.20 (0.48)	-9.691	<0.001
Purchase intention towards high quality rice	4.33 (0.11)	5.54 (0.11)	-7.975	<0.001
Attitude towards high quality rice	5.52 (0.06)	6.30 (0.07)	-8.574	<0.001
Perceived importance of environmental consequences relating to the purchase of high quality rice	3.85 (0.04)	4.34 (0.05)	-7.599	<0.001
Perceived importance of rice for healthy eating	5.61 (0.06)	6.34 (0.06)	-8.543	<0.001
Food safety concern towards rice	5.57 (0.06)	6.23 (0.06)	-7.540	<0.001

Standard errors are in the parentheses. All constructs were measured from (1) to (7), except for “Frequency of consuming high quality rice” and “Purchase intention towards high quality rice” were measured from (0) to (7), “Perceived importance of environmental consequences relating to the purchase of high quality rice” was from (1) to (5).

#### 3.4.4 Factors affecting consumers’ attitudes

First, confirmatory factor analyses (CFA) were performed for the data in the model for high quality rice as well as in the model for safe vegetables. The normality assumption in both models was not satisfied. Hence, the quasi maximum likelihood estimation models with robust standard error were applied (Model for rice: SRMR= 0.017, CD= 0.99; Model for vegetables: SRMR= 0.021, CD= 0.99)<sup>16</sup>. 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  $\alpha$ ) 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. Also, the composite reliability for the constructs ranged from 0.84 to 0.92 in the model for high quality rice, and from 0.82 to 0.89 in the model for safe vegetables. This

<sup>16</sup> Other fit measures such as RMSEA, CFI are not relevant due to the method use in this case.

indicates 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 3.5). Both models performed well, as supported by the satisfactory goodness-of-fit indices (model for high quality rice:  $\chi^2 = 61.87$ ,  $df=38$ ,  $p = 0.009$ ,  $\chi^2/df = 1.63$ , RMSEA= 0.036, SRMR= 0.017, CFI= 0.994, TLI= 0.992, CD= 0.994; model for safe vegetables:  $\chi^2=74.82$ ,  $df= 38$ ,  $p < 0.001$ ,  $\chi^2/df= 1.97$ , 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.

Table 3.5. Standardized solution of the structural equation models for high quality rice and for safe vegetables (June-July 2015)

	Attitude towards high quality rice (n=497)			Attitude towards safe vegetables (n=498)		
	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:  $\chi^2 = 61.87$ ,  $df=38$ ,  $\chi^2/df = 1.63$ ,  $p = 0.009$ ; RMSEA= 0.036, SRMR= 0.017, CFI= 0.994, TLI= 0.992; CD= 0.994; Model of safe vegetables:  $\chi^2=74.82$ ,  $df= 38$ ,  $\chi^2/df= 1.97$ ,  $p < 0.001$ ; RMSEA= 0.044, SRMR= 0.021, CFI= 0.990, TLI= 0.985; CD= 0.992.

### 3.5 Discussion

This study investigates consumers' familiarity with, attitudes and perceptions towards quality-certified food products, namely high quality rice and safe vegetables in Vietnam. This chapter 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 (De Koning et al., 2015; Thong et al., 2017). 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 et al. (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 better knowledge of food quality-related terms, which is consistent with Zander et al. (2015). Consumers who are familiar with food quality certifications have a more positive attitude towards quality foods (Batte et al., 2007; Roitner-Schobesberger et al., 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 et al. (2013). Microbiological contamination problems (Chau et al., 2014; Ha et al., 2008), chemical and pesticide contamination (Hoai et al., 2011) have indeed been reported for fresh vegetables. Our study also showed that there is a positive association between food safety concern about rice and attitude towards high quality rice. Rice samples were found to be contaminated with aflatoxin B1 in central Vietnam (Nguyen et al., 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 et al. (2008) 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. The limitations associated with sampling and self-reported measures are discussed in further detail in Chapter 7 of the thesis.

### **3.6 Conclusion**

Since there is a lack of knowledge about consumers' attitudes towards food with quality labels in developing countries such as Vietnam, this chapter 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.

It is recommended to evolve to one unified logo for VietGAP in order to increase consumers' familiarity with this certification. This idea has been discussed in detail in the discussion of Chapter 2 of the thesis. 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.



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## **Chapter 4. Determinants of buying behaviour towards food with quality labels**

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In the previous chapters, Chapter 2 showed that perceived importance of product attributes (intrinsic and extrinsic attributes) (cognitive factors) are important in consumers' food choices. In Chapter 3, consumers' attitudes (affective factors) towards quality-certified foods were investigated. Chapter 4 investigates a further important aspect, namely consumer purchase behaviour (conative and behavioural factors) towards quality-certified food in the Vietnamese food market. This chapter (Chapter 4) explores potential determinants of consumer purchase behaviour towards quality-certified food. These include cognitive factors (knowledge, competence, beliefs), affective factors (trust in the food quality certification system, motivations), and other factors. The objective is to examine factors that determine consumer purchase decision towards quality-certified food.

This chapter investigates the following research question:

RQ6. What determines consumer purchase behaviour towards quality-certified food?

Hypotheses:

Consumers who purchase quality-certified rice have stronger beliefs in the sensory aspects, health benefits, convenience characteristics, and value for money of certified rice (compared to conventional rice) than those who do not purchase quality-certified rice.

Consumers who purchase quality-certified rice have better knowledge of food quality certifications, higher perceived self-competence in identifying certified rice, higher perceived importance of environmentally friendly behaviour, and higher trust in the food quality certification system than those who do not purchase quality-certified rice.



## 4.1 Abstract

This chapter investigates the drivers of consumer purchase behaviour of certified rice in the South of Vietnam. Cross-sectional data were collected in August 2016 in a large city in the South of Vietnam, Can Tho city, by means of a consumer survey (n=199). A Probit model was employed to analyse factors that affect consumer purchase behaviour of certified rice. Results showed that the buyers of certified rice tend to completely trust in the food quality certification system for rice and have higher perceived self-competence in identifying certified rice. Therefore, it is recommended that consumers' trust in the food quality certification system for rice as well as their perceived self-competence in identifying certified rice should be significantly improved. Also, communication should focus on strengthening consumers' beliefs that certified rice has better sensory aspects, health benefits, convenience features and value for money compared to conventional rice. Furthermore, the urban upper-middle class consumer segment is a promising target market of certified rice.

**Keywords:** Consumers, Certified rice, Purchase, Quality, Vietnam

## 4.2 Introduction

Rice has been identified as a highly important commodity for both domestic consumption and export in Vietnam. The important roles of rice as a strategic food crop in Vietnam were described in detail in Chapter 1 (the general introduction of the thesis). Despite the high volume of Vietnam's rice exports, the price of Vietnamese quality rice is not as high as expected due to lack of accredited product quality standards, unclear trademark and lack of brand information (Vietnam Trade Promotion Agency - Export Promotion Center, 2008). Additionally, it is reported that Vietnamese consumers, especially those who live in urban areas, have shown their increased demand for food with quality labels in the context of Vietnam's rapid economic growth and fast urbanisation (Wang et al., 2014). From producers perspective, this evolution in the consumer demand provides new market opportunities for food with quality labels.

Nevertheless, it is observed that the management and regulatory system for food quality labels in the domestic food market is currently ineffective due to overlapping functions, unclear allocation of roles and responsibilities among different government agencies. This situation causes challenges and uncertainty among consumers seeking to match their preferences with food choices. This issue has been indicated in the literature (Verbeke, 2005). In terms of rice, there is a lack of transparency of information on the food labels for rice sold in the markets. Most rice sold in the markets are commonly characterised by the lack of information on the

labels (e.g. lack of a clear indication of origin, production methods, quality assurances, nutritional information, instructions for preparation or cooking, date of manufacture and expiration date). Also, in many cases, the information on the rice labels is, in general, insufficient and improperly presented. Thus, it is vital to build a quality labelling system for rice since this is the main staple food of Vietnamese consumers. It is therefore important to assess consumers' attitude and behaviour towards quality-certified rice to provide insights into an effective marketing strategy of quality-certified rice in Vietnam.

In order to improve the quality aspects of Vietnamese rice, it is important to look at the primary rice-producing area of Vietnam, the Mekong Delta in the South of Vietnam (MKD), its roles and challenges in terms of rice production of the country. The crucial roles of the MKD in the national and global food security as well as challenges for rice production in the MKD were described in detail in Chapter 1 (the general introduction of the thesis). Also, rice production in Vietnam was reported to attribute to a large amount of GHG emissions (Chapter 1, the general introduction of the thesis). Based on the important roles of the MKD, its challenges in rice production, and the current situation of unsustainable rice production in Vietnam, it is important to shift rice production in the MKD towards more sustainable rice farming practices (Berg et al., 2017; Demont & Rutsaert, 2017). The inclusion of sustainably-produced characteristic is therefore relevant and highly important for rice production in the MKD in the long term in its mission to ensure the national and global food security and to cope with climate-related challenges. In this context, investigation of consumers' attitude and behaviour towards certified rice such as sustainably-produced rice is of high importance to provide implications for the strategy development of quality rice as a primary and strategic food crop in Vietnam.

In the Vietnamese domestic food market, rice products are sold under various types of food quality labels. Examples of the food quality labels for rice are Hazard Analysis and Critical Control Points (HACCP), good agricultural practices (GAP) (e.g. VietGAP, GlobalG.A.P.), organic food. The details of these quality certifications were presented in Chapter 1 (the general introduction of the thesis).

Previous literature studies have focused mainly on rice production and Vietnamese rice producers (Berg et al., 2012; Klotzbücher et al., 2015; Shrestha et al., 2016), yet there is little literature on consumers' attitude and behaviour towards quality-certified rice in Vietnam. Therefore, this study aims at investigating consumers' attitude and behaviour towards certified rice and factors that affect the purchase of certified rice. To the best of our knowledge, this is the first consumer study on rice that examines both the effects of objective knowledge (i.e.



factual knowledge) of food quality certifications for rice and consumers' perceived self-competence (i.e. perceived individual skills and capabilities to distinguish certified rice from conventional one), as drivers of their purchase behaviour towards certified rice, in the context of developing countries. In addition, the study assesses the effects of consumers' beliefs, motivations and their individual characteristics on their purchase behaviour of certified rice. Our study contributes to the limited existing literature on consumers' attitude and behaviour towards quality-certified rice in an important rice producing country such as Vietnam. Based on the results, the study provides useful insights for value chain actors and policymakers in terms of developing an effective and comprehensive marketing strategy for the long term development of a quality labelling system for rice in the context of developing countries such as Vietnam.

### **4.3 Literature review**

In line with the general conceptual framework of the thesis in Chapter 1 and based on the literature of consumers' attitude and behaviour towards food, the cognitive, affective and conative and behavioural components have been included in the conceptual framework of Chapter 4 (Figure 4.1).

In this chapter, due to the limited literature on consumer attitude and behaviour towards food with quality labels (e.g. in the case of food produced with good agricultural practices (GAP)), thus, a substantial amount of the literature is situated in the domain of organic food. This is because organic food is also considered as one type of food with quality labels. This has been explained in Chapter 1 in terms of the scope of food with quality labels in this thesis. However, organic food has much stricter regulations in comparison to GAP-certified food and other safety-related labels, for example.

#### *4.3.1 The association between cognitive factors and conative and behavioural factors*

##### *Knowledge*

Consumers' knowledge and awareness of quality food may influence their conative and behavioural factors (Figure 4.1). Knowledge and awareness of food quality attributes were found to positively affect WTP for quality food (Akaichi et al., 2012; Demont et al., 2013a; Diagne et al., 2017; Haghjou et al., 2013; Lee et al., 2011; McFadden & Huffman, 2017; Xu & Wu, 2010; Zhang et al., 2012). Gracia and de Magistris (2007) found that knowledge of organic product does not have a direct effect on the final purchase of this product, however, it significantly influences purchase intention. Thus, Gracia and de Magistris (2007) suggested that

consumers who have higher levels of organic product knowledge are more likely willing to purchase the product. On the contrary, some previous studies did not find a significant influence of awareness and knowledge on the WTP for rice (Depositario et al., 2009) and on the purchase intention of organic food (Yin et al., 2010).

#### *Perceived self-competence*

Consumers' perceived self-competence in choosing quality food is an important determinant of purchase behaviour (Figure 4.1). As mentioned in Chapter 1 of the thesis, perceived self-competence is referred to the perceived "confidence in achieving certain tasks" (Harter, 1983; cited in Jambunathan et al., 1999, p.168). The level of perceived self-competence relates, to some extent, to the level of uncertainty. The higher level of uncertainty (low transparency, low accuracy of information), the lower level of perceived confidence, and therefore results in lower level of perceived self-competence. Teng and Lu (2016) observed that lower perceived self-competence and higher perceived uncertainty (e.g. lack of knowledge and low confidence in organic food choice decision-making) negatively affected Taiwanese consumers' involvement in organic food, which further eroded their purchase intentions. High perceived uncertainty (i.e. low perceived self-competence) may be due to information incompleteness to make an informed food choice and competing or contradictory preferences, for example, among different food attributes (Hassan et al., 2013). Higher perceived self-competence in choosing organic food, for example, was found to significantly boost purchase intentions of organic food (Chryssochoidis, 2000).

#### *Consumers' beliefs (sensory aspects, health benefits, convenience features, value for money)*

Consumers' beliefs in different aspects of quality food (such as in the sensory aspects, health benefits, convenience features and value for money) compared to conventional food may influence the conative and behavioural factors (Figure 4.1).

#### *Sensory aspects*

Consumers' beliefs that organic food is tastier, for example, were found to drive purchase intentions towards organic food (Bratanova et al., 2015). Previous studies have shown that frequent buyers of organic food have a stronger belief that organic food is tastier (compared to conventional food) than non-buyers (Tsakiridou et al., 2008; Van Loo et al., 2013). Sensory aspects, such as flavour and aroma, were found to influence purchase frequency of rice in Malaysia (Farah et al., 2011).

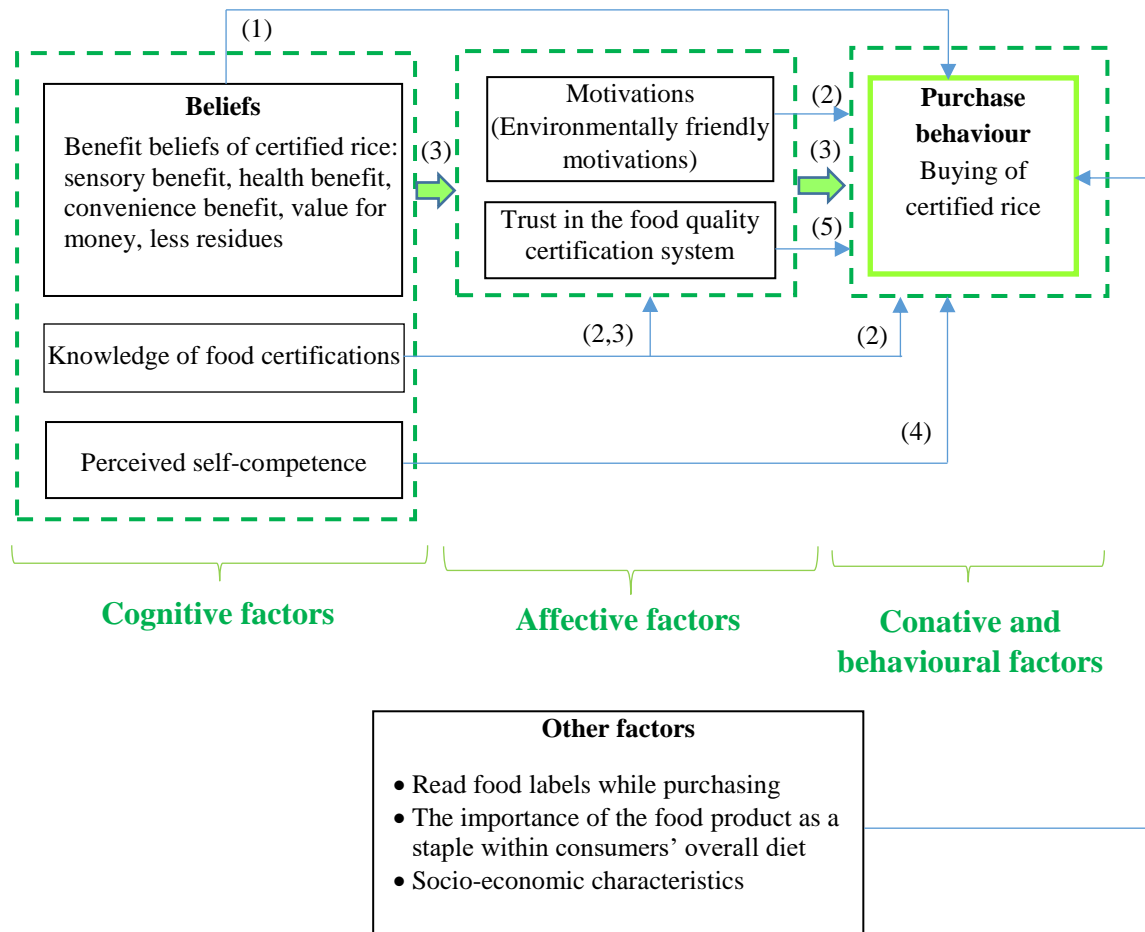


Figure 4.1. Conceptual framework of the study: determinants of consumer buying behaviour towards quality-certified rice

(1) Farah et al. (2011), Ergin and Ozsacmaci (2011), Van Loo et al. (2013); (2) Yadav (2016); (3) Lavidge and Steiner (1961); (4) Chrysochoidis (2000); (5) Nuttavuthisit and Thøgersen (2017), Slamet et al. (2016).

### Health benefits

There is quite some evidence that perceived health benefits are an important driver of WTP and purchase behaviour for quality food. Health consciousness was found to have a positive influence on the purchase intention of organic food in Malaysia (Salleh et al., 2010), Sri Lanka (Kapuge, 2016), Turkey (Çabuk et al., 2014), Cambodia (Kouy et al., 2016), and among young consumers in India (Yadav, 2016). Mondelaers et al. (2009), for example, found that consumers are willing to pay extra for vegetables with a high level of vitamin A. Similarly, De Steur et al. (2012a) found that Chinese consumers are willing to pay more for genetically modified (GM) rice with health benefits. Lee and Yun (2015) revealed that consumers' perceptions of the nutritional aspects of organic food positively affect utilitarian (useful, beneficial) and hedonic (pleasant, agreeable) attitudes towards buying organic food. Other studies found that health consciousness has a positive effect on the purchase intentions towards organic food in India (Yadav, 2016) and Taiwan (Teng & Lu, 2016). Health was indicated as an important factor that

affects organic food purchase in China (Yin et al., 2010), and Turkey (Ergin & Ozsacmaci, 2011). Finally, Liu et al. (2013) reported that information about safe food, e.g. relating to the absence of residues or chemical hazards, significantly affects consumer behaviour and food purchasing decisions in China.

#### *Convenience features*

Perceived product availability was reported as one of the predictors of behavioural intention towards purchasing sustainable dairy products among young purchasers (Vermeir & Verbeke, 2008). Perceived availability and convenience attributes were indicated to positively influence purchase intention of organic food in Thailand (Pomsanam et al., 2014) and Cambodia (Kouy et al., 2016). Additionally, perceived availability has a positive effect on organic food purchase in Turkey (Ergin & Ozsacmaci, 2011) and Malaysia (Hossain & Lim, 2016).

#### *Value for money*

Consumers' perceived price or "value for money" of quality food is found to be a determining factor in purchase decisions. Van Loo et al. (2013), for example, found that frequent buyers of organic food have more positive perceptions about the price of organic food as compared to non-buyers. Sirieix et al. (2011) observed that price is a barrier for purchasing organic food in China, and thus suggested more efforts to price quality food more competitively. In addition, price perception (value for money) was found to be positively associated with green products purchase (e.g. organic food purchase) in Pakistan (Khan & Mohsin, 2017). Also, value for money was found as an important factor of organic food purchase in China (Chen et al., 2014). Indonesian consumers who perceived that organic food is substantially more expensive than conventional food were less willing to purchase organic products (Slamet et al., 2016).

### *4.3.2 The associations between affective factors and conative and behavioural factors*

#### *Trust in the food quality certification system*

Trust in the food quality certification system is an essential factor conditioning consumer behaviour (Figure 4.1). Literature on the effect of consumers' trust in the food quality certification system on conative and behavioural factors has been illustrated in detail in section 1.2.2.3 in Chapter 1 of the thesis.

#### *Perceived psychological consequences of environmentally friendly behaviour (Environmentally friendly motivations)*

Consumer attitudes towards the environment may explain their purchase behaviour with respect to environmentally-friendly food (Environmentally friendly motivations, Figure 4.1). Environmental concerns, for example, were found to positively affect purchase intentions of

organic food among young consumers in India (Yadav, 2016). Additionally, ecological motives were found to drive Taiwanese consumers' involvement in organic food which further increased their purchase intentions of organic food (Teng & Lu, 2016). Perceived importance of environmental consequences was found to be positively associated with Vietnamese consumers' attitudes towards quality-certified rice (My et al., 2017). Finally, consumers' concerns for environmental issues were found to drive the purchase of organic vegetables in Indonesia (Slamet et al., 2016).

#### *4.3.3 The associations between other factors with conative and behavioural factors*

The other factors (such as reading of food labels, the importance of the food product as a staple within consumers' overall diet, and socio-economic characteristics) may influence conative and behavioural factors (Figure 4.1). Literature of the associations between reading of food labels, the importance of the food product as a staple within consumers' overall diet, with behavioural factors has been illustrated in detail in section 1.2.4 in Chapter 1 of the thesis. In addition, literature of the effects of socio-economic characteristics such as income, household size, education, age, gender on conative and behavioural factors was described in detail in section 1.2.4 in Chapter 1 of the thesis.

### **4.4 Materials and methods**

#### *4.4.1 Measures*

##### *Beliefs in different aspects of certified rice compared to conventional rice*

Beliefs related to GAP-certified rice were measured by asking participants how they evaluate several attributes of GAP-certified rice compared to conventional rice (Grankvist & Biel, 2007; Steptoe et al., 1995; Van Loo et al., 2013): (i) sensory attributes (i.e. aroma, appearance, texture, and taste); (ii) convenience attributes (i.e. ease of cooking, cooking time, and availability); (iii) health-related attributes (i.e. vitamins and minerals, fibre, and nutritional content); (iv) value for money; and (v) residue levels. Responses were recorded on a 7-point interval scale with "1" as much worse and "7" as much better. The composite variables of the belief items were formulated: "sensory (SENS)" (Cronbach's  $\alpha = 0.79$ ), "convenience (CONV)" (Cronbach's  $\alpha = 0.87$ ), and "health (HEALTH)" (Cronbach's  $\alpha = 0.62$ ).

##### *Objective knowledge of food quality certifications for rice*

To test participants' knowledge on rice certification, they were asked to evaluate five statements related to food quality certification for rice as true or false, or no answer. These include: (i) Certified VietGAP rice ensures that the whole rice production process is controlled to ensure

the safety for human consumption (T); (ii) Certified HACCP rice indicates that the rice is safe for human consumption (T); (iii) Certified GAP rice does not take into account the welfare of the workers in the supply chain of the product (F); (iv) Certified VietGAP rice indicates that the rice is produced taking into account the negative impacts of farming on the environment (T); (v) Certified rice standards can only be accredited by the government and not by another third party (F). The dummy variable “knowledge (KNOW)” corresponds to “1” if a participant answered all questions correctly and “0” otherwise.

#### *Trust in the food quality certification system for rice*

Similarly to Janssen and Hamm (2012), consumers were asked to indicate how much they trust the food quality certification system for rice. Responses were scored on a 7-point interval scale with “1” indicating complete distrust and “7” complete trust. A very small proportion of the participants had low and neutral ( $\leq 4$ ) scores for trust. Therefore, the dummy variable “TRUST” has a value of “1” for those who indicated to completely trust the food quality certification system for rice and “0” otherwise.

#### *Consumers’ perceived self-competence*

Similarly to Chrysochoidis (2000), consumers were presented with statements to measure their perceived self-competence (“COMPT” (Self-competence)) in distinguishing and comparing a certified product from a conventional one. These include: (i) I know a lot about certified rice products; (ii) I know how to distinguish certified from conventional rice; (iii) Before I purchase rice I know how to look at the differences between products (Cronbach’s  $\alpha = 0.89$ ). Answers were recorded on a 7-point Likert scale where “1” indicates strong disagreement and “7” strong agreement.

#### *Psychological consequences of environmentally friendly behaviour (Environmentally friendly motivations)*

The perceived psychological consequences of environmentally friendly behaviour (“ENV” (Environment)) were measured on a 7-point Likert scale following Abdul-Muhmin (2007) (Cronbach’s  $\alpha = 0.71$ ). Several statements were used: (i) I would feel a sense of satisfaction if I could separate my garbage for recycling; (ii) I would feel a sense of achievement if I can teach my children to respect the environment; (iii) It would mean a lot to me if I could contribute to protect the environment.

### *Reading of food labels*

Analogously to Tegene et al. (2003), participants were asked how often they read food labels while purchasing food. The responses ranged from “1” for “never” to “5” for “always”. The dummy variable “READ” (Read food labels) has a value of “1” for those who indicated to often or always read food labels while purchasing food and “0” otherwise.

### *The importance of the food product as a staple within consumers’ overall diet (“CONS” (Consumption of rice))*

Participants were also asked whether or not they eat rice on a daily basis (“1” refers to daily consumption of rice; “0” otherwise).

### *Buying of certified rice*

Following Van Loo et al. (2013), consumers were asked “Out of 10 times that you buy rice, how often do you choose rice with a certified label?”. The concepts of different certified labels were provided (Appendix A2). Answer was on an 11-point scale ranging from “never” to “always” (10 out of 10 times). Because there is a large proportion of consumers who have never bought certified rice, thus, the variable “BUY” of certified rice corresponds to 1 for those who had the purchase of certified rice equals or exceeds 1 time, and 0 otherwise (i.e. for those who never bought).

### *4.4.2 Data collection*

Cross-sectional data were collected in August 2016 via a consumer survey ( $n=199$ ) in Can Tho, a large city in the Mekong Delta in the South of Vietnam. Consumers were recruited at the entrance of a large supermarket and asked if they had 10-15 minutes to participate in a small survey. This supermarket was selected as it caters a large number of food shoppers on a daily basis and has a large range of rice with quality labels compared to other supermarkets in the city. Participants went under screening questions of the recruiters. Participants who were the primary household food shoppers for rice (with the age from 23 years on)<sup>17</sup> and consumed rice were eligible to participate in the survey ((analogous with Moser and Raffaelli (2012)). The study applied non-probability quota sampling with age, education, and income as quota control characteristics to ensure that the composition of the sample matched the distribution in the

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<sup>17</sup> This is a survey with experimental auctions. This study targeted consumers from 23 years on. This aims to provide more targeted implications while taking into account the requirements of product evaluation and real payment of the auction mechanism, and the target population of quality-certified rice. Detailed reasons for targeting participants from 23 years are provided in section 6.5.1, Chapter 6.

population. Consumers were first asked about their knowledge of food quality certifications for rice. Next, their attitudes and behaviour towards certified rice were investigated. The socio-economic characteristics of the participants were collected last.

Characteristics of the sample were presented in Table 4.1. Females were dominated in the sample (86%) as they are typically the primary food shoppers for households in Vietnam. Participants represented different age and education categories. The age of participants ranged from 25 to 70 years and the average age is 45 years. Nearly half of the participants reported having an upper-middle income. Approximately 52% of the participants have a college (not university) or a higher degree. About 27% of the respondents have a secondary school degree and the remaining 21% have a primary or lower education level. An overview of the characteristics of the sample and of the population is provided in Table A4.1 (Appendix A4)<sup>18</sup>.

Table 4.1. Characteristics of the sample (n=199, August 2016)

Items	%	Items	%
Age (years)	45.38 <sup>a</sup> (10.40) <sup>b</sup>	Education	
≤30	10.6	Elementary and lower	6.0
31-54	68.8	Secondary	15.1
≥55	20.6	High school	27.1
Gender		Higher education (not university)	15.6
Male	13.6	University and upper	36.2
Female	86.4	Children under 15	
Income		No	35.7
Medium and lower	52.3	Yes	64.3
Upper-middle	47.7	Household size (person)	4.44 <sup>a</sup> (1.72) <sup>b</sup>

<sup>a</sup>mean; <sup>b</sup>standard deviation

#### 4.4.3 Data analysis

Data were analysed using SPSS 22.0 (SPSS Inc., Chicago, IL, USA) and NLOGIT 5.0 (Econometric Software, Inc., Plainview, NY). The significance level was set at 5%.

#### Probit model specification

<sup>18</sup> As we targeted consumers from 23 years on, the age of the participants is a little bit older on average compared to the general population. The lowest age observed in this sample is 25 years. The age groups of this sample are relatively representative for the population including those from 25 years on (Table A4.1, Appendix A4).



Our objective is to model the purchase of certified rice as a discrete decision (yes/no), therefore, the adoption of a limited dependent variable model is appropriate in this case. We opted for using probit modelling following Greene (1997). The dichotomous dependent variable takes an empirical specification formulated as a latent response variable, say  $BUY^*$ , where:

$$BUY_i^* = \beta_0 + \sum_{k=1}^K \beta_k x_{ki} + \varepsilon_i, \quad (4.1)$$

In equation (4.1),  $i$  refers to the respondent,  $x_{ki}$  represent  $k= 1$  through  $K$  independent variables explaining whether respondent purchases certified rice for respondent  $i$  with  $\beta_k$  as parameter indicating the effect of  $x_k$  on  $BUY^*$ .  $\varepsilon_i$  is the stochastic error term for respondent  $i$ .

The explanatory variables ( $x_k$ ) include cognitive factors (consumers' knowledge of food quality certifications for rice; perceived self-competence; consumers' beliefs in different aspects of certified rice compared to conventional rice such as sensory aspects, health benefits, convenience features, residue level, and value for money); affective factors (consumers' trust in the food quality certification system; environmentally friendly motivations); and other factors (read food labels; the importance of the food product as a staple within consumers' overall diet; socio-economic characteristics).

The variable  $BUY^*$  is defined as:

$$BUY = \begin{cases} 1 & \text{if consumer } i \text{ purchases certified rice,} \\ 0 & \text{if consumer } i \text{ does not (i.e. never) purchase certified rice.} \end{cases} \quad (4.2)$$

In the probit model, the assumption is that the cumulative distribution function for the error term follows the cumulative normal distribution, represented by  $\Phi(\bullet)$ . This implies that the probability of investigated events occurring (if consumer purchases certified rice) can be defined as:  $\text{prob}(BUY_i = 1) = \Phi(BUY_i^*)$ . Given the mathematical form of the cumulative normal distribution function  $\Phi(\bullet)$ , and after specifying an appropriate set of exogenous explanatory variables  $x_{ki}$ , the parameters can be estimated through the value of log likelihood function. The empirical specification of the probit model for purchasing certified rice is:

$$\text{prob}(BUY_i = \text{yes}) = \Phi(BUY_i^*) \text{ and}$$

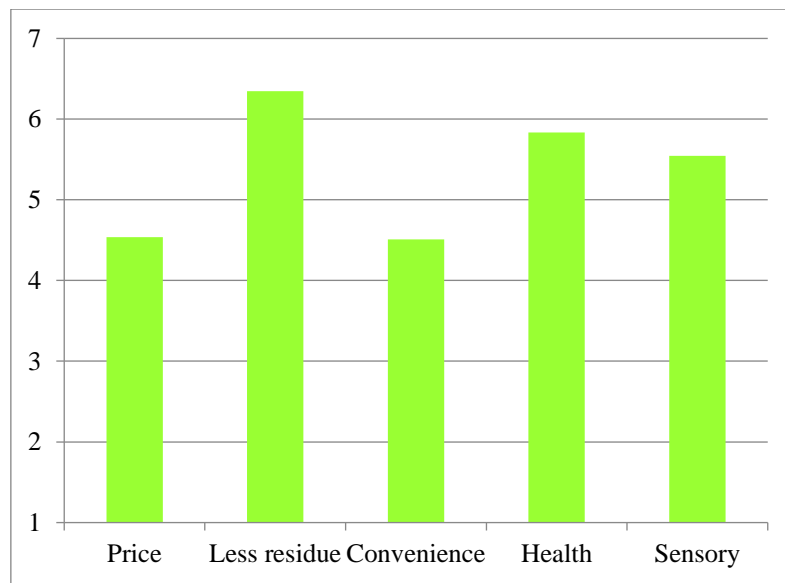
$$\text{prob}(BUY_i = \text{no}) = 1 - \Phi(BUY_i^*), \text{ with}$$

$$BUY_i^* = \beta_0 + \beta_1 KNO_i + \beta_2 COMPT_i + \beta_3 SENS_i + \beta_4 CONV_i + \beta_5 HEALTH_i + \beta_6 PRICE_i + \beta_7 LRESI_i + \beta_8 TRUST_i + \beta_9 ENV_i + \beta_{10} READ_i + \beta_{11} CONS_i + \beta_{12} AGE_i + \beta_{13} CHILD_i + \beta_{14} EDU_i + \beta_{15} INC_i + \beta_{16} HHSZ_i + \varepsilon_i, \quad (4.3)$$

According to Greene (1997), a measure suggesting the goodness of fit of probit model is the percentage of observations that are correctly predicted by the model. Another goodness of fit measure for dichotomous dependent variable models has been illustrated by McFadden (1974). The  $R^2$  with a value of 0 indicates no fit and a value of 1 corresponds to perfect fit. These measures of fit are calculated and reported in the empirical results section.

#### 4.5 Results

Consumers' beliefs in different aspects of GAP-certified rice compared to conventional rice were explored in Figure 4.2. On average, consumers believe that GAP-certified rice contains substantially less pesticide, has better health benefits, and better sensory aspects compared to conventional rice.



Beliefs were measured from “much worse” (1) to “much better” (7)  
For all belief items n=198, for health n=197, for less residue n=199.

Figure 4.2. Consumers' beliefs in different aspects of GAP-certified rice compare to conventional rice (August 2016)

As indicated in the introduction of Chapter 1 of the thesis, food safety is a major concern in Vietnam (Chau et al., 2014; Ha et al., 2008; Hung et al., 2017; Le et al., 2017; VFA, 2000-2012; World Bank, 2016a). Hence, it is observed that, in recent years, Vietnamese consumers have shown an increasing concern about food safety issues. In addition, rice that is produced

with sustainable production methods (e.g. VietGAP, Global G.A.P., organic), is guaranteed and promoted as safe food labels in the market. These may explain why consumers tend to have a stronger belief in the less residue aspect of certified rice compared to conventional rice.

In addition, consumers believe that certified rice has better health benefits compared to conventional rice. This health benefits belief is perceived by consumers. In the market, not all the types of certified rice have more health benefits compared to conventional rice. However, there are some certain types of rice containing specific health benefits. For these types of rice, producers can register for official certificates (in terms of specific health benefits) guaranteed by the quality assurance and testing centres. It is observed that producers also use these official certificates to communicate with consumers (e.g. via advertising) to enhance consumer's belief in the health benefits of these products. In terms of belief in the sensory aspect of certified rice, currently, consumers consider that certified rice has somewhat better sensory aspect (rating about 5/7) compared to conventional rice. During the survey, consumers shared their thinking that the sensory aspects of certified rice should be significantly improved. The difference in the rating for the sensory aspect between certified rice and conventional rice in this study is not large, indicating more room to invest in the sensory aspects of certified rice to demonstrate that certified rice has good sensory characteristics. This can contribute to improving consumer's belief in the sensory aspects of certified rice. This idea is discussed further in the discussion of this chapter. In terms of price perception (i.e. value for money) of certified rice, on average, consumers were not yet convinced by the value for money of certified rice (the rating for this aspect is about neutral level 4/7). Thus, it is important to improve consumer's belief in the value for money of certified rice. This idea is also discussed further in the discussion of this chapter. Similar to the belief in the value for money of certified rice, on average, the convenience characteristics of certified rice are considered as relatively similar to that of conventional rice.

Table 4.2 illustrates the descriptive statistics of consumers' perceived self-competence in distinguishing between certified rice and conventional rice. It is likely that consumers were, on average, unsure about their own skills and capabilities to differentiate certified rice from conventional rice. This result implies that consumers do not currently have good perceived self-competence in identifying certified rice. This may be due to limited or absence of salient intrinsic and extrinsic quality attributes that can support consumers in distinguishing certified rice from conventional rice.

Table 4.2. Descriptive statistics of consumers' perceived self-competence  
(n=199, August 2016)

Statements	Mean	Std. dev
I know a lot about certified rice products	4.11	1.62
I know how to distinguish certified rice from conventional rice	4.33	1.56
Before I purchase rice I know how to look at the differences between products	4.69	1.33

Items were measured from “strongly disagree” (1) to “strongly agree” (7).

Description of variables used in the model of buying certified rice was presented in Table 4.3.

Table 4.3. Description of variables used in the Probit model (n=199, August 2016)

Variable	Description	Unit	Mean (Std. dev)
<b>Conative and behavioural factors</b>			
BUY	Participant buying situation of certified rice	1= if participant buys certified rice, 0= otherwise	0.52 (0.50)
<b>Cognitive factors</b>			
Knowledge (KNO)	Objective knowledge of food quality certifications for rice	1= have all answers correct, 0= otherwise	0.62 (0.49)
Self-Competence (COMPT)	Perceived self-competence in identifying certified rice	From 1= strongly disagree to 7= strongly agree	4.38 (1.37)
Sensory benefit (SENS)	Belief in the sensory appeal of GAP-certified rice	From 1= much worse to 7= much better	5.54 (0.72)
Health benefit (HEALTH)	Belief in the health benefits of GAP-certified rice	From 1= much worse to 7= much better	5.84 (0.77)
Convenience benefit (CONV)	Belief in the convenience of GAP-certified rice	From 1= much worse to 7= much better	4.51 (0.87)
Value for money (PRICE)	Belief that GAP-certified rice is good value for money	From 1= much worse to 7= much better	4.54 (1.50)
Less residues (LRESI)	Belief that GAP-certified rice has much less residue	1= much better (less residue compared to conventional rice), 0= otherwise	0.46 (0.49)
<b>Affective factors</b>			
Trust in the food quality certification system (TRUST)	Trust in the food quality certification system for rice	1= completely trust, 0= otherwise	0.24 (0.43)
Environment (ENV)	Perceived psychological consequences of environmentally friendly behaviour	From 1= strongly disagree to 7= strongly agree	6.63 (0.41)
<b>Other factors</b>			
Read food labels (READ)	Reading of food labels while purchasing food	1= often and always read food labels, 0= otherwise	0.82 (0.38)
Consumption of rice (CONS)	The importance of the food product as a staple within consumers' overall diet	1= daily consume rice, 0= otherwise	0.79 (0.41)
AGE	Age of the respondent	years	45.38 (10.40)
CHILD	Having children under 15	1= yes, 0= otherwise	
Education (EDU)	Education of the participant	1= elementary and lower, 2= secondary, 3= high school, 4= higher education (not university), 5= university and upper	3.61 (1.28)
Income (INC)	Income self-reported of the respondent	1= upper-middle, 0= otherwise	0.48 (0.50)
Household size (HHSZ)	Number of members live in the same household	persons	4.44 (1.72)

For sensory, convenience, price n=198; for health n=197.

Results of the probit analysis for buying certified rice were presented in Table 4.4. There was no concern over multicollinearity of variables used in the model as the bivariate correlation coefficients of any pair of selected explanatory variables were acceptable (the highest observed correlation coefficient was 0.377).  $R^2$  and correct predictions % measures of goodness of fit suggest a good fit of the proposed model.

Table 4.4. Probit estimates, dependent “BUY” of certified rice (August 2016)

Parameter $k$	Estimate $\beta_k$ (Std. Error)	p-value	Marginal effect (Std. Error)	p-value
<b>Cognitive factors</b>				
KNO	0.057 (0.268)	0.8325	0.012 (0.055)	0.8330
COMPT	0.340*** (0.111)	0.0021	0.069*** (0.021)	0.0009
SENS	0.831*** (0.229)	0.0003	0.169*** (0.042)	0.0001
CONV	0.443** (0.176)	0.0120	0.090*** (0.034)	0.0077
HEALTH	0.524*** (0.193)	0.0066	0.106*** (0.038)	0.0046
PRICE	0.210** (0.090)	0.0200	0.043** (0.018)	0.0163
LRESI	-0.075 (0.287)	0.7942	-0.015 (0.058)	0.7927
<b>Affective factors</b>				
TRUST	0.781** (0.340)	0.0214	0.158** (0.065)	0.0156
ENV	0.349 (0.307)	0.2555	0.071 (0.062)	0.2503
<b>Other factors</b>				
READ	-0.203 (0.363)	0.5770	-0.041 (0.072)	0.5727
CONS	-0.174 (0.307)	0.5701	-0.035 (0.062)	0.5685
AGE	0.002 (0.012)	0.8403	0.001 (0.002)	0.8402
CHILD	0.114 (0.300)	0.7031	0.023 (0.060)	0.7019
EDU	0.131 (0.103)	0.2066	0.027 (0.021)	0.1997
INC	0.736*** (0.265)	0.0054	0.155*** (0.055)	0.0048
HHSZ	-0.059 (0.081)	0.4718	-0.012 (0.017)	0.4713
Constant	-14.914*** (2.929)	<0.0001	-	-

Notes: n=194, Number of positive observations= 104.

\*\*\*, \*\*, \*: Significance at 1%, 5%, 10% level.

Log likelihood function = -69.652, Restricted log likelihood= -133.965.

$\chi^2_{(df=16)} = 128.626$  ( $p < 0.001$ ), McFadden Pseudo  $R^2 = 0.480$ , % of correct prediction = 84.8.

Each significant variable was interpreted holding other variables in the model at their constant levels. The marginal effects of variables used in the model were estimated. TRUST is significant, meaning that being those who completely trust in the food quality certification

system for rice increases the probability of buying certified rice by 0.16. Perceived self-competence (COMPT) is significant, illustrating that a one-unit change (on a 7-point scale ranging from “strongly disagree” to “strongly agree”) in consumers’ perceived self-competence in identifying certified rice increases the probability of buying certified rice by 0.07. In terms of consumers’ beliefs, sensory aspects (SENS) is significant, meaning that a one-unit change (on a 7-point scale ranging from “much worse” to “much better”) in the belief that certified rice has better sensory aspects (compared to conventional rice) increases the probability of buying certified rice by 0.17. In addition, convenience (CONV) is significant, implying that a one-unit change (on a similar 7-point scale) in the belief that certified rice has better convenience features (compared to conventional rice) increases the probability of buying certified rice by 0.09. HEALTH is significant at 1%, indicating that a one-unit change (on a similar 7-point scale) in the belief that certified rice has better health benefits (compared to conventional rice) increases the probability of buying certified rice by 0.11. PRICE is significant, meaning that a one-unit change (on a similar 7-point scale) in the belief that certified rice is good value for money (compared to conventional rice) raises the probability of buying certified rice by 0.04. In terms of socio-economic characteristics, income (INC) is significant at 1%, indicating that being those who reported having an upper-middle income increases the probability of buying certified rice by 0.16.

#### **4.6 Discussion**

This study investigates the drivers of consumer purchase of certified rice in urban area in the Vietnamese MKD. Results indicated that trust in the food quality certification system has a significant influence on the probability of buying certified rice which is similar to the literature (Ergin & Ozsacmaci, 2011; Nuttavuthisit & Thøgersen, 2017; Slamet et al., 2016; Yin et al., 2010). Figure 4.3 shows that the proportion of those who completely trust in the food quality certification system was higher among the buyers than the non-buyers. Thus, it is suggested that consumers’ trust in the food quality certification system for rice should be strongly enhanced. Establishing credible information channels that consumers can access and refer to when purchasing quality rice is necessary to improve consumers’ trust in the food quality certification system for rice. In addition, information related to food quality certifications should be properly governed and controlled in order to enhance consumers’ trust in the food quality certification system.

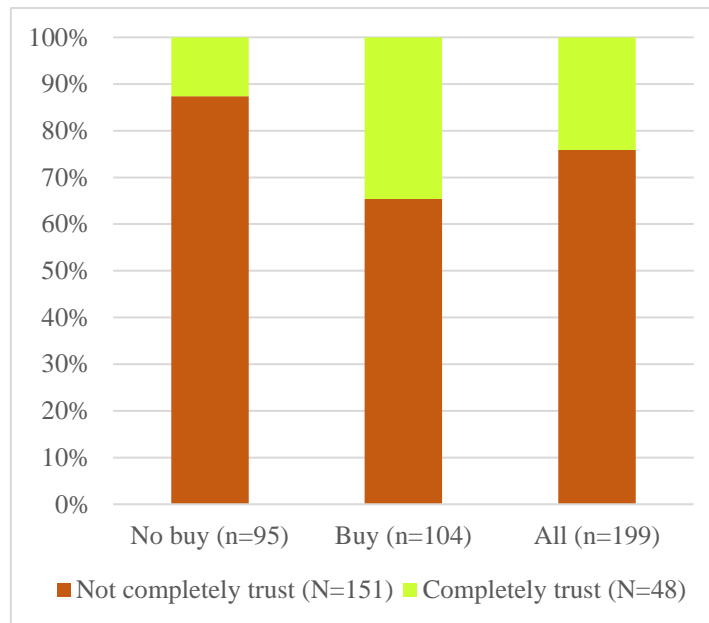


Figure 4.3. Consumers' trust in the food quality certification system for rice by the purchase of certified rice (n=199, August 2016)

Note: Chi-square test of trust in the food quality certification system and purchase of certified rice is illustrated in Table A5.1 (Appendix A5).

Results showed that a higher level of perceived self-competence in identifying certified rice can significantly contribute to increasing the purchase of certified rice. Thus, implications for producers and marketers of certified rice is to increase consumers' perceived self-competence (i.e. individual skills and capabilities) in recognising and distinguishing certified rice from conventional rice. The higher perceived self-competence in distinguishing certified rice from conventional rice, the more likely consumers will purchase certified rice. Rice producers (i.e. rice companies) should attempt to provide basic skills for consumers to identify differences between certified rice and conventional rice. Thus, it is suggested to develop a unified logo for VietGAP products. The discussion towards issuing this logo has been provided in detail in the discussion of Chapter 2 of the thesis.

Depending on the resources of the producers (or enterprises) and the characteristics of target segments, appropriate tools can be applied to improve the perceived self-competence of consumers. In order to have an effective campaign, the producers (or enterprises) first need to identify their target segments and support these segments with informed food choices. Our study showed that consumers in the upper-middle income segment may be a promising target segment for quality rice. In the case the companies have sufficient resources (e.g. financial, human resources), it is suggested to use integrated marketing communication tools (combining different tools) to increase the effectiveness of the communication in terms of reaching the target segments. For example, they can use the combination of various tools, such as advertising



(on TV, in the supermarket, on food package), fairs, farm visit tours, talk shows with experts, social media. As indicated in Chapter 2, information from supermarket is used relatively often and consumers tend to trust in this information source. In addition, consumers also tend to trust in the experts, although they do not currently use this information source often. It is observed that there is a rapid increase in the number of people access to the Internet and use social media in Vietnam in recent years. Hence, it is suggested that the company should build their own official website that can be served as a trustworthy and credible tool to provide official information about the companies. Also, a unique brand image for the company should be built to support consumers in recognising their products. In the case the companies have limited resources, it is important to select the tools that can reach more consumers with less resources. For example, social media is a very popular tool that can be used at relatively low cost. However, it is important to notice that social media may also have some limitations. If companies want to use this tool, they have to be very careful in maintaining the credibility of their communication. This is because there are a lot of non-official communication on the social media that may affect consumer trust in this information source. As indicated in Chapter 2, trust in the information from the Internet is relatively low.

In addition, it is also suggested that the government should develop a public communication policy that aims to improve consumers' knowledge of food quality certifications in the country. In 2016, the MARD issued the Decision No. 629/QĐ-BNN-QLCL that mentioned the role of the government agents in collaboration with other societal organisations to promote the benefits of sustainable production practices. However, this regulation is still very brief and need to be developed further with specific and detailed communication activities and plans to improve the consumers' knowledge of food quality certifications.

It is observed that many enterprises face financial difficulties to invest in sustainable production practices. Therefore, it is suggested that the government should create supportive mechanisms related to this issue (e.g. improving access to loan for enterprises who wish to invest in sustainable production practices). This can significantly contribute to encouraging and supporting enterprises to engage in sustainable production practices. This idea is discussed further in section 7.1.3.1 implications for producers in Chapter 7 of the thesis.

While the perceived self-competence positively influences the probability of buying certified rice, objective knowledge does not significantly influence the purchase of certified rice. It is interesting to notice that objective knowledge (i.e. factual knowledge) does not play a significant role in consumer purchase behaviour towards certified rice. Instead, the perceived

self-competence (i.e. perceived individual skills and capabilities to distinguish certified rice from conventional rice) contributes an important role in determining consumer purchase of certified rice. However, this does not necessarily mean that objective knowledge is not important in assessing consumer behaviour towards quality food. It is likely that although a good objective knowledge is important, but a good objective knowledge alone is still insufficient to translate from consumers' attitude to a real purchase behaviour. This study showed that perceived self-competence is a crucial factor that determines purchase decision towards certified rice. Figure 4.4 shows that the buyers of certified rice tend to have higher levels of perceived self-competence (i.e. the buyers represented more in the medium (for scores  $\geq 4.0$  and  $\leq 5.0$ ) and high (for score  $> 5.0$ ) levels of perceived self-competence) than the non-buyers of certified rice. Thus, a good knowledge of food quality certifications for rice should be strongly enhanced with good competence in recognising and identifying certified rice.

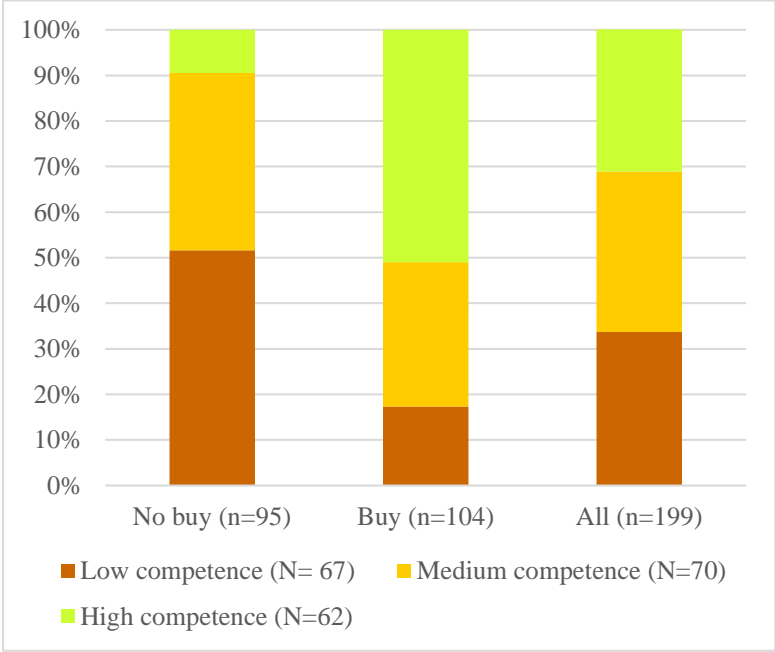


Figure 4.4. Consumers' perceived self-competence by the purchase of certified rice (n=199, August 2016)

Note: Chi-square test of perceived self-competence and purchase of certified rice is illustrated in Table A5.2 (Appendix A5).

Sustainable rice production is an emerging trend in many developing countries in Asia and the Pacific (FAO, 2014b; Oxford Committee for Famine Relief (OXFAM), 2015), and the market of certified sustainably-produced rice is currently not well developed in these countries. Therefore, consumers in other developing countries in Asia and the Pacific may experience similar trends such as not completely trust in the food quality certification system for rice and relatively low perceived self-competence levels in identifying certified rice, similar to what we

have observed for the Vietnamese consumers in this study. Consumers' trust in the labelling and certification system of organic food was indeed reported to have a positive influence on the purchase intention towards organic food in Thailand (Pomsanam et al., 2014), Malaysia (Kai et al., 2013), and Cambodia (Kouy et al., 2016). Thai consumers' trust in international organic certification bodies was similarly found to positively affect organic food purchase (Nuttavuthisit & Thøgersen, 2017). Thus, to further increasing the purchase of certified rice, it is important to improve consumers' trust in the food quality certification system for rice as well as strengthen their perceived self-competence in identifying certified rice. This implication is not only applicable to Vietnam but may also be relevant for certain developing countries in Asia and the Pacific region where rice is a highly important staple food.

Consumer's belief in the sensory aspects of certified rice (i.e. better sensory characteristics compared to conventional rice) further strengthens their purchase of certified rice which is in line with previous studies (Tsakiridou et al., 2008; Van Loo et al., 2013). During the survey, consumers shared their thinking that it is highly appreciated that the rice is sustainably-produced and is guaranteed with food quality certifications, however, the sensory aspects of certified rice should also be significantly improved according to consumers' preferences. Thus, more efforts should be invested to improve the sensory aspects of certified rice and to demonstrate that certified rice has good sensory aspects. To further develop the sensory aspects of certified rice, it may require a good collaboration among agricultural institutions, rice producers and the stakeholders. In addition, information related to the sensory aspects of rice should be properly presented on the rice label and package so that consumers can refer to this information when purchasing rice. Pilot experiments on consumers' acceptability regarding the sensory aspects of new certified rice products is recommended before products entering the market. It should be notice that different regions have their prominent preferences for rice varieties as well as sensory aspects. As a marketer, this aspect should be taken into account in research and development (R&D) activities of the product for specific target markets such as selection of rice varieties with relevant sensory characteristics to a specific geographical region.

Consumer's belief in the health benefits of certified rice such as rice that is rich in vitamins and other nutrients (compared to conventional rice) positively influences the probability of buying certified rice. This is in line with previous consumer studies (Ergin & Ozsacmaci, 2011; Sirieix et al., 2011; Yin et al., 2010). Implication for producers and research institutions is to invest in rice containing health benefits (e.g. rice varieties with good nutrients). Another important implication for rice producers is to focus communication on the health benefits of certified rice.

This will further enhance consumer's belief in the health benefits of certified rice and consequently increase the probability of buying certified rice. However, since there is an uncontrollable growth of various food labels and claims, and a lack of effective regulatory and management of information provided on the food labels in the Vietnamese food market, it is strongly recommended to increase information credibility provided on the food labels and claims.

Similarly to Van Loo et al. (2013) and Slamet et al. (2016), this study showed that consumer's belief in the value for money of certified rice (compared to conventional one) has a positive effect on the probability of buying certified rice. This implies that rice producers should make more effort to demonstrate that certified rice is good value for money. In order to illustrate the value for money of certified rice, different aspects of certified rice should be emphasized such as its quality and safety is accredited by credible accreditation agencies, also other attributes such as traceability of origin should be highlighted. Increasing consumers' knowledge about these features of certified rice, together with enhancing their knowledge of the costs and benefits associated with sustainable production practices, may raise their appreciation of the value for money of certified rice. The idea of improving consumers' appreciation of the costs and benefits associated with the production of certified rice as well as emphasizing the quality assurances and traceability (to demonstrate the value for money of certified rice) can be piloted in some target markets such as the upper-middle income consumers in urban areas as these consumers have shown an increased demand for food with quality labels (Wang et al., 2014) and are more likely willing to purchase quality-certified rice. At the same time, rice producers should attempt to make certified rice affordable. The price of certified rice may vary according to the certification schemes such as the national (VietGAP) or the global (GlobalG.A.P.) schemes. Currently, the certification costs and renewal fees for foods including rice (e.g. for example, in the case of VietGAP) are relatively high for producers. This is also the reason why the costs associated with food production under good agricultural practices labels are relatively high. Therefore, an implication for policymakers is to create mechanisms that can effectively support producers (including farmers) in obtaining food quality certifications for rice, such as VietGAP, at affordable costs. This can significantly contribute to reducing the production costs of certified rice, and thus increasing the affordability of this rice.

Consumer's belief that certified rice has better convenience traits (i.e. ease of cooking, cooking time, and availability) (compared to conventional rice) has a positive effect on the probability of buying certified rice. This is in the same manner as previous consumer studies (Ergin &

Ozsacmaci, 2011; Kouy et al., 2016; Pomsanam et al., 2014). It is noticed that nowadays consumers in urban areas are getting busier and thus do not spend much time cooking. Also they may not invest substantial effort to search for products that are not easily available to purchase. Thus, an implication for rice producers is to improve convenience aspects of quality rice (e.g. reducing amount of time spent on preparation and cooking) and increase the availability of certified rice products in the market (e.g. making certified rice easily accessible). Although most consumers use rice cooker to cook rice, the aspects of ease of cooking, amount of time spent on preparation and cooking, and the quality of rice after cooking should not be ignored. For example, there are some rice varieties with good sensory aspects or health characteristics, however, these rice require more efforts to prepare and cook, which make themselves unattractive to urban consumers' food choices due to inconvenient characteristics. Therefore, convenience aspects of quality-certified rice are also of high importance and should be taken into account in the marketing strategies of certified rice for specific target markets.

This study showed that income has a positive effect on the probability of buying quality-certified rice which is in line with previous studies (Demont et al., 2012; Slamet et al., 2016; Yin et al., 2010). As the urban upper-middle income consumers are likely to be the buyers of certified rice, the marketing strategies of certified rice should focus on these consumers as they have better affordability, accessibility, and are likely willing to purchase quality-certified rice.

This study sample is limited to consumers who live in a large Vietnamese city which limits generalisation of the results to the overall Vietnamese population. The questionnaire completed by participants was self-reported which may suffer, to some extent, from recall or social desirability bias. Similar to Singla (2010), in our study, more than 80% of consumers reported to read food label often while purchasing food. This may be due to high food safety concern in the context of a developing country such as Vietnam (Chau et al., 2014; Ha et al., 2008; Hung et al., 2017; Le et al., 2017; VFA, 2000-2012; World Bank, 2016a). However, we acknowledge that self-reported questionnaire was employed, thus, self-reported information, such as read food label while purchasing food, may suffer, to some extent, from social desirability bias. The limitations associated with self-reported measures are discussed in further detail in section 7.1.2.2 in Chapter 7 of the thesis. It is recommended to use methods such as observational studies that can account for limitations associated with self-reported measures and social desirability bias. In addition, the sample is dominated by more female as they are typically the main food shoppers for the household. The limitations associated with sampling are also discussed in further detail in section 7.1.2.1 in Chapter 7 of the thesis. As the trend towards

sustainable food production and consumption has increased, it is recommended to study and investigate if there are opportunities for other sustainably-produced foods (e.g. dairy, meat, seafood) in the domestic food market.

#### **4.7 Conclusions**

This study investigates consumer purchase behaviour of certified rice and factors that affect their buying behaviour, in the context of a developing country, such as Vietnam. It is recommended that consumers' trust in the food quality certification system for rice should be significantly improved. Additionally, consumers' perceived self-competence in distinguishing certified rice from conventional rice should be strongly enhanced. This can be done via enhancing consumers' skills and capabilities to identify certified rice. For instance, it is recommended to develop a unified logo for VietGAP food products (that can also be used for VietGAP certified rice). The discussion towards issuing this logo has been provided in detail in the discussion of Chapter 2 of the thesis.

Communications should focus on strengthening consumers' beliefs that certified rice has better sensory aspects, health benefits, convenience features and value for money compared to conventional rice. Depending on the region, the preferences for sensory aspects of rice should be taken into account in the R&D of the rice companies. It is suggested that the marketing strategy of quality-certified rice should focus on the urban upper-middle class consumers since these consumers are more willing to purchase this rice. Furthermore, the health benefits and convenience aspects of certified rice should be improved and emphasized in the communication strategy of certified rice.

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## **Part Four.**

### **Preference and willingness-to-pay for quality rice**

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In Part Two, results of Chapter 2 showed that cognitive factors such as intrinsic aspects (health, safety, quality, trustworthiness) and extrinsic aspects (product labelling, packaging characteristics) are important in consumers' food choices. In Part Three, consumers' attitudes (affective factors) (Chapter 3) and purchase behaviour (conative and behavioural factors) (Chapter 4) towards food with quality labels in the Vietnamese food market were investigated. In Part Four, the thesis further explores consumers' preferences and WTP for quality rice (conative and behavioural factors). More specifically, in Part Four, Chapter 5 investigates consumers' preferences and WTP for food quality attributes in the case of rice by conducting a choice experiment. In this chapter, consumers' preferences, WTP, and their trade-off for different quality rice attributes including sustainable production methods (organic, IPM), health benefits and fair farmer prices were investigated. While Chapter 5 uses more hypothetical settings by conducting a choice experiment, Chapter 6 employs non-hypothetical experimental auctions to elicit consumers' WTP for rice under increasing levels of information referring to quality labelling (certified sustainable production practices (VietGAP)) and other information cues (supplementary information about the certification and traceability).





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## Chapter 5. Valuation from a choice experiment

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This chapter investigates the following research question:

RQ7. How much are consumers willing to pay for quality rice attributes?

RQ7a. How much are consumers willing to pay for rice that is produced under sustainable production methods (organic, IPM)?

RQ7b. How much are consumers willing to pay for rice with claimed health benefits?

RQ7c. How much are consumers willing to pay for rice that guarantees a fair price for farmers?

Hypotheses:

Consumers are willing to pay extra for rice with different quality attributes such as rice that is produced with sustainable production methods (Organic, IPM), rice with claimed health benefits, and rice that guarantees a fair price to farmers.

This chapter is based on: **My, N. H. D.**, Van Loo, E. J., Rutsaert, P., Tuan, T. H., & Verbeke, W. (2017). Consumer valuation of quality rice attributes in a developing economy: Evidence from a choice experiment in Vietnam. *British Food Journal* (In Press).



## 5.1 Abstract

This chapter investigates consumers' willingness to pay (WTP) for quality rice attributes in urban areas in the South of Vietnam, including organic and Integrated Pest Management (IPM) as sustainable production methods, and claims about health benefits and fair farmer prices. Cross-sectional data were collected in 2015 using a survey including a choice experiment (CE) ( $n = 500$ ). Generalized mixed logit models were estimated. Vietnamese consumers are willing to pay a premium of 82% for organic rice, and 45% for rice produced using IPM, compared to conventionally produced rice. They are also willing to pay a premium of 95% for rice claiming to be rich in vitamins and other nutrients, and 50% for rice that guarantees a fair price to rice farmers. This study makes a significant contribution to the limited existing literature on consumers' valuation of quality rice attributes in the context of developing countries such as Vietnam. The study shows that rice that is sustainably produced using organic or IPM methods provides a promising avenue for rice producers. This study highlights that there is an added value for rice with credence attributes in relation to sustainable production methods, health benefits, and fair farmer prices in a developing country.

**Keywords:** Consumer; IPM; Organic; Rice; Sustainability; WTP

## 5.2 Introduction

Food systems have changed in recent decades. The goal is not only to feed the population but also to meet current and future nutritional needs and consumer preferences, as well as to use resources more efficiently and to adapt production methods to a changing environment. There has been a growing interest in exploring consumer behaviour with respect to quality aspects of food in the context of developing countries. Previous studies in developing countries have evaluated consumer perceptions and valuations of environmentally friendly attributes such as organic or environmentally friendly production methods (Kavoosi-Kalashami & Heydari-Shalmani, 2014; Sriwaranun et al., 2015; Vidogbéna et al., 2015), health benefits of food products such as foods enriched with vitamins and other nutrients (Depositario et al., 2009; De Steur et al., 2012a), or attributes associated with the well-being of farmers such as fair farmer prices (Garcia-Yi, 2015). The present study fits within this stream of research. More specifically, the study envisages analysing the valuation of sustainable production methods, health benefits, and price fairness for rice among consumers in Vietnam.

This study explores consumers' valuations of three quality rice attributes: sustainable production methods (organic and Integrated Pest Management (IPM)), a claim about the health

benefits of rice containing vitamins and other nutrients, and a claim about fair farmer prices. To the best of our knowledge, no study has previously evaluated consumers' willingness-to-pay (WTP) for rice using this set of attributes in the context of an Asian country. It is worth noting that while the valuation of these rice attributes is well-recognised in developed countries, little is known about this issue in developing countries such as Vietnam. Our study focuses on rice as this is the most important crop in Vietnam for both domestic consumption and export. The important roles of rice as a strategic food crop in Vietnam were presented in detail in Chapter 1 (the general introduction of the thesis). While many studies have concentrated on Vietnamese rice producers (Klotzbücher et al., 2015; Shrestha et al., 2016), there is a lack of research on consumers, who ultimately determine the success of quality rice in markets. This study focuses on urban consumers' valuation of quality rice attributes, as metropolitan consumers show an increased demand for food with quality labels in the context of Vietnam's rapid economic growth and fast urbanisation (Wang et al., 2014).

Sustainable farming practices have become increasingly important in the agricultural production system. Sustainable agriculture is defined "as practices that meet current and future societal needs for food and fibre, for ecosystem services, and for healthy lives, and that do so by maximising the net benefit to society when all costs and benefits of the practices are considered" (Tilman et al., 2002, p.671). In addition, sustainable agriculture is usually associated with biological (physical), economic and social dimensions (Lütteken & Hagedorn, 1999). IPM is considered as one approach towards more sustainable agriculture as it uses a combination of cultural, physical, biological and chemical means to manage and control insects, weeds and plant diseases, taking into account these three dimensions of sustainable agriculture (European Crop Protection Association (ECPA), 2017). In organic agriculture, the use of synthetic fertilizers and pesticides is prohibited (FAO, 1998). In 2005, it was estimated that around 46% of the total national greenhouse gas (GHG) emissions in Vietnam came from agricultural activities, within which rice cultivation accounted for 44% (Lam, 2016). The use of more environmentally friendly inputs that can replace or reduce the use of synthetic fertilizers, for example, may contribute to reducing N<sub>2</sub>O, which is one of the main sources of GHG emissions (Valin et al., 2013). Since both organic and IPM adopt environmentally friendly production approaches, these two methods are referred to as sustainable production methods for rice in the context of the present study.

The sustainability aspect of food production and consumption is emerging in Vietnam and is receiving increasing attention (De Koning et al., 2015; Thong et al., 2017). The Mekong Delta

(MKD), the primary rice-producing region of Vietnam, has crucial roles in the national and global food security which were illustrated in detail in Chapter 1 (the general introduction of the thesis). However, the MKD is currently facing several challenges in agricultural production which were also described in detail and highlighted in Chapter 1 (the general introduction of the thesis). Due to the important roles and challenges for agricultural production (including rice production) in the MKD, more sustainable rice farming practices should be considered in this region (Berg et al., 2017; Demont & Rutsaert, 2017). In this context, assessment of consumers' WTP for rice that is produced with the organic or IPM as sustainable production methods (Appendix A6) is of high importance in Vietnam.

In addition to sustainable production practices, the nutritional and health aspects of food are receiving more attention in developing countries. Malnutrition is an enormous threat in Southeast Asia and rice is seen as one of the key solutions to tackle this problem (Dipti et al., 2012). In recent years, increasing attention has been paid to consumer preferences for the health benefits of rice via fortification (Laillou et al., 2012), or biofortification (De Steur et al., 2012a) to improve the nutritional value of rice in developing countries. Consequently, it is relevant to investigate consumers' WTP for rice that claims to be "rich in vitamins and other nutrients" in a developing country.

Another important issue relating to food production in developing countries is the well-being of farmers, which relates, among others, to the guarantee of fair prices. A fair price for farmers can contribute to improving farmers' income and reducing rural poverty (Canales, 2011). With rising consumer income in developing countries, especially in urban areas in Vietnam, it is interesting to explore attitudes towards products that guarantee fair farmer prices.

The research objective of this study is to investigate the Vietnamese consumers' preferences and WTP for rice with specific quality attributes referring to sustainable production methods (organic and IPM), health benefits from vitamins and other nutrients, and fair farmer prices, by conducting a choice experiment. This study makes a significant contribution to the limited existing literature on consumers' valuation of quality rice attributes in the context of developing countries. This study offers insights into effective marketing strategies for rice produced with organic or IPM production methods, and rice with a health benefit claim, or rice that guarantees a fair price to farmers. Based on the results, the study provides implications for strategy development of a quality labelling system for rice in Vietnam.

### 5.3 Literature review

Previous studies have explored consumer preferences for more sustainable production methods, such as organic (Hai et al., 2013; Kavooosi-Kalashami & Heydari-Shalmani, 2014; Sriwaranun et al., 2015; Zanolli et al., 2013), IPM (Vidogbéna et al., 2015), or both organic and IPM (Bazoche et al., 2014). The reported price premiums for organic rice in Iran (Kavooosi-Kalashami & Heydari-Shalmani, 2014) and in the metropolitan Bangkok, Thailand (Sriwaranun et al., 2015) were 14% and 51%, respectively. Other studies have indicated that consumers were willing to pay premiums of 38% for vegetables with minimised pesticide residues in Benin (Vidogbéna et al., 2015), and 39% for vegetables with safety attributes in Kenya (Lagerkvist et al., 2013). Consumers who showed more concern about the presence of chemicals in vegetables (e.g. choy sum) were willing to pay extra for organic vegetables in Vietnam (Hai et al., 2013). Consumers in some European countries were willing to pay more for IPM and organically produced food compared to conventional food (Bazoche et al., 2014). Similarly, Italian consumers were reported to prefer organic beef over conventional beef (Zanolli et al., 2013).

Consumers' WTP for rice with health benefits has been investigated in some previous studies in developing and emerging countries (Depositario et al., 2009; De Steur et al., 2012a). Chinese consumers were willing to pay extra for genetically modified (GM) rice with a high folate content (De Steur et al., 2012a). Filipino consumers were also willing to pay a premium for GM rice enhanced with vitamin A (Depositario et al., 2009).

Consumers' WTP for fair trade food products has been widely conducted in developed countries (e.g. Akaichi et al., 2016; Van Loo et al., 2015), but only a limited number of studies have explored consumers' attitudes towards price fairness in developing countries. Fair farmer price is a new and emerging trend in less developed countries (Forsyth, 2014). For example, Peruvian consumers with middle and high incomes were willing to pay a premium for fair trade certified yellow chilli peppers (Garcia-Yi, 2015).

Few studies have incorporated both organic and fair trade attributes. Belgian consumers were willing to pay extra for chocolate with a fair trade attribute, whereas they were mostly not interested in organic food labels (Rousseau, 2015). Van Loo et al. (2015) found that US consumers are willing to pay more for organic coffee than for fair trade coffee. Didier and Lucie (2008) showed that the simultaneous presence of fair trade and organic attributes on chocolate was not preferred in comparison to the presence of each individual attribute on the labels.

## 5.4 Materials and methods

### 5.4.1 Choice experiment design

In this study, a choice experiment (CE) was used, which is a stated preference method to evaluate trade-offs between different product attributes (Gao & Schroeder, 2009). In the CE, participants are asked to make a choice between product alternatives in a choice set (Lusk & Schroeder, 2004). CEs are based on the random utility theory, which assumes that an individual makes a choice between different alternatives in order to maximise his utility according to his budget constraints (McFadden, 1974; Thurstone, 1987). CEs are consistent with Lancaster's consumer theory, which proposes that the product's utility can be derived from various attributes and consumers make decisions based on their preferences for these product attributes (Lancaster, 1966).

In this CE study, participants were asked to make a choice between two hypothetical constructed alternatives described by attributes and attribute levels and a no-buy option. The no-buy option was included to make the buying situation more realistic and to avoid biased results from forced choices (Dhar & Simonson, 2003). Four attributes were included, based on the literature and discussion with experts: (1) production method, (2) health benefit claim, (3) fair farmer prices, and (4) price (Table 5.1). The production method includes three levels, namely conventional, IPM and organic (Appendix A6). The health benefit claim indicates whether or not the rice is labelled "rich in vitamins and other nutrients" (Appendix A6). Fair farmer prices indicate whether or not the farmers receive a fair price compared to the other actors in the supply chain (Appendix A6). As illustrated in the introduction of this chapter (Chapter 5), these attributes were selected because they are highly important and relevant in the context of developing countries such as Vietnam. The selected price range of VND12500<sup>19</sup> to VND45000 is based on the Vietnamese market price for various rice types, ranging from conventional to organic rice at different points-of-sale (supermarkets, traditional markets), complemented by discussion with experts, retailers, and local consumers.

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<sup>19</sup> In July 2015, USD1 = VND21700, VND1000 ≈ USD0.046.

Table 5.1. Selected attributes and attribute levels

Attribute	Level
Production method	Conventional IPM Organic
Health benefits	“Rich in vitamins and other nutrients” is not present “Rich in vitamins and other nutrients” is present
Fair farmer prices	No information is provided Fair
Price (VND1000/kg)	12.5, 18.0, 26.5, 45.0

We assume that all other attributes not presented in the CE are the same across the product alternatives. Before the CE, explanations were provided about the meaning of attributes and the corresponding levels (Appendix A6) and cheap talk was provided to reduce potential hypothetical bias (Cummings & Taylor, 1999; Silva et al., 2011). Participants were informed about potential hypothetical bias and were reminded about their budget constraints (Cummings & Taylor, 1999), similar to Van Loo et al. (2014).

The CE was designed in NGENE (Choice Metrics Pty Ltd., Sydney, Australia) using three steps. First, an efficient design using zero priors was generated for the pilot study. Second, the pilot study was conducted ( $n = 40$ ) and a multinomial logit (MNL) model was estimated. Third, the MNL parameter estimates were used as Bayesian priors to create the final Bayesian D-efficient design (Bliemer et al., 2008) with eight choice sets. An example of a choice set is given in Figure 5.1.



Attribute	Alternative A	Alternative B	Alternative C
Production Method	Organic	IPM	
Fair farmer prices	Fair		Neither alternative A nor B is chosen
Health benefits	Rich in vitamins and other nutrients		B is chosen
Price	VND26500/kg	VND18000/kg	
I would buy .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 5.1. Example of a choice set

#### 5.4.2 Econometric models

According to the random utility theory (McFadden, 1974), the  $i$ th consumer's utility for choosing alternative  $j$  is specified by the equation (5.1):

$$U_{ijt} = \beta_i X_{ijt} + \varepsilon_{ijt} \quad (5.1)$$

Where  $i = 1, \dots, n$  refers to the number of the participant;  $j$  refers to the alternative  $j$  in the choice set  $t$ ;  $\beta_i$  is the vector of individual parameters;  $X_{ijt}$  is the vector of observed variables related to the alternative  $j$  and individual  $i$ ;  $\varepsilon_{ijt}$  is the unobserved error term which is assumed to be independent of  $\beta$  and  $X$ .

Depending on the assumptions, different econometric models can be applied. The MNL model assumes that consumers have homogeneous preferences. However, it is more realistic to allow for heterogeneity in consumers' preferences. Therefore, mixed logit models, also called random parameter logit (RPL) models, are often applied. In a CE, lexicographic preferences<sup>20</sup> and random choice decisions<sup>21</sup> may be present (Fiebig et al., 2010). Fiebig et al. (2010) developed the generalized multinomial logit model that allows for better flexible distributions and takes into account scale heterogeneity. Scale heterogeneity accounts for lexicographic and random choice behaviour (Fiebig et al., 2010). In this study, we adopted the generalized mixed logit

<sup>20</sup> In the CE, lexicographic behaviour may be present. This means that there are participants who likely rank the attributes and choose an alternative based merely on a certain level of their most preferred attribute(s) (Campbell et al., 2006), for example, participants who prefer low price only focus on selecting the alternative with the lowest price, or those who prefer organic production methods only focus on selecting alternatives with an organic production method.

<sup>21</sup> Random choice decision means that participants have low responsiveness to the attributes.

(GMXL) model which was developed based on the specifications of the mixed logit model in Train (2009), Hensher and Greene (2003), and the generalized multinomial logit model in Fiebig et al. (2010). The GMXL model incorporates taste and scale heterogeneity within its specification (Hensher, 2012).

In order to obtain WTP estimates, it is important to select a satisfactory distribution for the price coefficient, as it will have an influence on the WTP distribution (Daly et al., 2012; Hess & Train, 2017). In the WTP estimation, price is entered as the denominator, thus it should not overlap zero<sup>22</sup> (Daly et al., 2012; Hess & Train, 2017) as this may lead to biased results (Daly et al., 2012). As recommended by Daly et al. (2012), Hess and Train (2017), our study adopts a distribution of the price coefficient that does not overlap zero (i.e. lognormal) to ensure finite moments in the distribution of WTP. Thus, price is specified as a random parameter following a lognormal distribution, as suggested by Hess and Train (2017). Other attributes are specified as random parameters following a normal distribution.

In the GMXL model, the  $\beta_i$  in the equation (5.1) is specified as:

$$\beta_i = \sigma_i \beta + [\gamma + \sigma_i(1 - \gamma)]\Gamma\omega_i, \omega_i \sim N[0, I], 0 \leq \gamma \leq 1 \quad (5.2)$$

Where:  $\sigma_i$  is the individual specific standard deviation of the idiosyncratic error term, also referred to as the scale factor;  $\omega_i$  is the unobserved heterogeneity, assumed to be standard normally distributed;  $\Gamma$  is a triangular matrix (Greene, 2012);  $\gamma$  indicates how the variance of residual taste heterogeneity varies with scale (Fiebig et al., 2010). In equation (5.2),  $\sigma_i$  has the following form:

$\sigma_i = \exp [-\tau^2/2 + \tau v_i]$ ,  $v_i \sim N[0,1]$ ; where parameter tau ( $\tau$ ) is the coefficient of the unobserved scale heterogeneity (Greene, 2012). For more details about the GMXL model, we refer to Hensher et al. (2015).

The model was estimated by using the GMXLOGIT command in NLOGIT 5 (Econometric Software, Inc., Plainview, NY) (Hensher et al., 2015) and was employed with 500 Halton draws (Train, 2000). The marginal WTP for each attribute was calculated by the negative ratio of the partial derivative of the utility function with respect to a given attribute level, divided by the derivative of the utility function with respect to the price attribute (Gracia et al., 2009; Morrison et al., 2002).

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<sup>22</sup> When the distribution of price overlaps zero, as in the case of a normal distribution, the mean WTPs for all attributes are undefined (infinite) (Daly et al., 2012; Hess & Train, 2017).

### 5.4.3 Model specification

Based on the attributes and attribute levels (Table 5.1), the utility function for participant  $i$  from choosing alternative  $j$  in the choice set  $t$  is:

$$U_{ijt} = \beta_{Organic}Organic_{ijt} + \beta_{IPM}IPM_{ijt} + \beta_{Fair}Fair_{ijt} + \beta_{Health}Health_{ijt} + \beta_{price}Price_{ijt} + \beta_{Nobuy} + \varepsilon_{ijt} \quad (5.3)$$

Where  $\beta_i$  are the coefficients.  $\beta_{Nobuy}$  represents the alternative-specific constant representing the no-buy option.  $IPM_{ijt}$  and  $Organic_{ijt}$  are dummy variables taking the value of 1 if the production method is IPM and organic, respectively, and 0 otherwise (i.e. conventional production method).  $Health_{ijt}$  is a dummy variable taking the value of 1 if the claim “rich in vitamins and other nutrients” is present and 0 otherwise.  $Fair_{ijt}$  is a dummy variable taking the value of 1 if the product guarantees a fair price to farmers and 0 otherwise.  $Price_{ijt}$  is the price of 1 kg of rice (in VND1000/kg).

### 5.4.4 Data collection

The description of data collection and characteristics of the sample have been illustrated in detail in section 2.4.1 in Chapter 2 of the thesis.

## 5.5 Results

The results of the generalized mixed logit (GMXL) model are presented in Table 5.2. As expected, the coefficient of the no-buy option is significant and negative, indicating that participants gain a higher utility from choosing a rice alternative than from the no-buy option. The coefficients of  $Organic_{ijt}$  and  $IPM_{ijt}$  are positive and significant, implying that consumers prefer organically or IPM produced rice over conventional rice. The coefficient of  $Health_{ijt}$  is positive and significant, indicating that consumers prefer rice claiming to be “rich in vitamins and other nutrients” to rice without this claim and are willing to pay a premium for it. The coefficient of  $Fair_{ijt}$  is also significant, indicating that consumers favour rice that guarantees a fair price to farmers over rice that does not provide this guarantee.

The standard deviations are not significant in the model. However, the scale parameter tau ( $\tau$ ) is significant. Interpretation of the significance in the  $\tau$  should be made carefully. We estimated the GMXL model with correlated as well as with uncorrelated specifications. The latter is not reported here, as both models yielded almost similar results in terms of significant coefficients

and model fit. The finding that the coefficients in the Cholesky matrix are not significant suggests no or low correlation between the attributes. The significance in the  $\tau$  indicates that there may be sources of correlation present in the data. However, it is not straightforward to conclude whether the significance in the  $\tau$  comes from the correlation between the attributes or from other sources. There are different viewpoints in terms of the discussion on identifying and separating scale heterogeneity from other sources of heterogeneity (Greene & Hensher, 2010; Hensher, 2012; Hess & Rose, 2012; Hess & Train, 2017). Yet, the GMXL model in preference space might allow for more flexible distributions of random parameters (Hess & Rose, 2012), which justifies its use in our case.

Table 5.2. Results Generalized Mixed Logit (GMXL) Model (June-July, 2015)

Parameters	Mean	SE	p-value
<b>Coefficient</b>			
<i>Organic</i>	0.464***	0.145	0.0013
<i>IPM</i>	0.256***	0.088	0.0036
<i>Health</i>	0.535***	0.099	<0.001
<i>Fair</i>	0.281***	0.108	0.0090
<i>Price</i>	-2.575***	0.099	<0.001
<i>Nobuy</i>	-4.086***	0.174	<0.001
<b>Standard deviation</b>			
<i>Organic</i>	0.004	7.732	0.9995
<i>IPM</i>	0.000	6.151	1.0000
<i>Health</i>	0.006	3.816	0.9988
<i>Fair</i>	0.005	6.076	0.9994
<i>Price</i>	0.004	1.851	0.9983
Variance parameter tau ( $\tau$ )	0.316***	0.001	<0.001
Sample mean (sigma (i))	0.996***	0.316	0.0016
McFadden's Pseudo R <sup>2</sup>	0.461		
Log-likelihood	-2366.89		
Restricted log-likelihood	-4394.45		
$\chi^2$ (df = 23)	4055.12***		
<i>n</i>	4000		

Note: SE: Standard Error; \*\*\* $p < 0.01$

The marginal WTP for the attributes investigated are presented in Table 5.3. The marginal WTP for 1 kg of rice with claimed health benefits is VND12320, which is a 95% premium over 1 kg of conventional rice<sup>23</sup>. Consumers are willing to pay more for rice that is sustainably produced with the IPM or organic method compared to conventionally produced rice. This results in a marginal WTP of VND5890 (45% premium) and VND10690 (82% premium) for IPM and organic, respectively. On average, consumers are willing to pay VND6470 extra for 1 kg of rice that guarantees a fair price to farmers, as compared to rice without this claim. This is a 50% premium compared to conventional rice.

Table 5.3. Marginal WTP (VND1000/kg) (n=500, June-July 2015)

Attribute	Mean	Standard Error	Min.	Max.	Premium (%)
Organic	10.69	0.68	0.95	84.46	82
IPM	5.89	0.38	0.53	46.50	45
Health	12.32	0.79	1.10	97.13	95
Fair	6.47	0.41	0.57	51.17	50

## 5.6 Discussion

The study showed that consumers from two main urban areas in the South of Vietnam prefer rice produced with sustainable production methods (organic and IPM) over conventional rice and are willing to pay a premium for it. This is consistent with previous studies indicating a price premium for organic rice in developing countries (Kavoosi-Kalashami & Heydari-Shalmani, 2014; Sriwaranun et al., 2015). The price premium for organic rice is 82%. However, this premium is still lower than the current price of organic rice on the Vietnamese market. This is consistent with Liu et al. (2013) who reported that the price premiums that Chinese consumers were willing to pay for “safe food” (which was defined in that study as hazard free, green, or organic food) were lower than the premiums in the market. Although motives and barriers for consumers were not investigated in the present study, this might explain why market shares of organic rice remain modest at best.

Consumers prefer rice produced with the IPM production method over conventional rice, which is in line with previous studies in both developing (Vidogbéna et al., 2015) and developed countries (Bazoche et al., 2014). Similar to Bazoche et al. (2014), organic rice has a higher WTP premium (82%) compared to rice produced with the IPM method (45%). It should be noted that, the larger the actual price gap between IPM and organic products, the higher the

<sup>23</sup> 1 kg of conventional rice was, on average, priced at VND13000 in the study area in 2015 and this was used as the reference price to calculate the percentage of the premiums.

market potential for IPM products might be, as the latter provides a more affordable (cheaper) alternative for consumers interested in sustainable production methods.

There are several reasons why the price premium for organic rice in this study is still somewhat lower than that of organic rice in the market. It is reported that Vietnamese consumers' awareness of food quality related terms, such as good agricultural practices and organic food, is relatively low (My et al., 2017). Thus, more efforts are needed to increase consumers' knowledge and understanding of the benefits of organic and IPM production methods. A greater appreciation of sustainable production methods (i.e. organic, IPM) is likely to lead to a higher WTP for organic and IPM rice. In addition, it is suggested that producers should also make more effort to supply affordable organic rice. Currently, the Vietnamese government does not have an official national standard for organic food<sup>24</sup>. Thus, developing a national organic standard, and detailed organic production guidelines for specific product categories<sup>25</sup>, and an accurate and trustworthy mechanism to control and regulate this standard is recommended. Once this official national organic standard is in place, additional support (e.g. from the government or non-governmental organisations) should be provided to producers to assist in adopting the standard at an affordable cost. This could significantly contribute to making organic rice more affordable and available.

As urban consumers are willing to pay extra for rice produced with more sustainable methods, an implication for policymakers is to support sustainable rice farming practices by making adequate investment in quality assurance and product labelling for these types of rice. This activity could effectively contribute to enhancing consumers' trust in the product, improving the quality of rice for domestic consumption, and strengthening global food quality through Vietnam's important rice exports. This implication is not only applicable to Vietnam but may also be relevant for other Asian developing countries, such as Thailand (Kongsom & Kongsom, 2016) and India (Manaloor et al., 2016), where rice is also of high importance for both domestic consumption and export.

This study demonstrated that rice with the health benefit claim "rich in vitamins and other nutrients" is valued higher compared to rice without this claim, which is similar to previous findings on food in developing countries (Depositario et al., 2009; De Steur et al., 2012a). Promisingly, consumers are willing to pay 95% extra for the rice with claimed health benefits compared to rice without this claim, implying a potential market for rice that contains, and

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<sup>24</sup> Although there are some basic guidelines for organic production issued by the MARD (2006) and MOST (2015) (as mentioned in the introduction in Chapter 1 of the thesis) however, these documents do not really work well.

<sup>25</sup> More discussion on this idea has been provided in section 7.1.3.4 implications for policymakers in Chapter 7 of the thesis.

stresses, specific health benefits. To achieve further growth in rice with health and/or nutritional labels, regulations governing health benefit claims in Vietnam are recommended to avoid misleading claims and to ensure credibility and increase consumer trust. In order to develop rice with additional nutritional value (i.e. health benefits), researchers can use several approaches, for example, employing fortification (Laillou et al., 2012), or using biofortification of rice (e.g. through either adapted agronomic practices that involve adding mineral or inorganic compounds to fertilizers (Hefferon, 2015); conventional plant breeding (Haas et al., 2005; Hefferon, 2015); or genetic engineering (Hefferon, 2015)). The topic of biofortified crops (including those for rice) and their potential health benefits has been extensively studied in the context of developing and emerging countries (De Steur et al., 2010; 2012b; 2013; 2017a; Garcia-Casal et al., 2017). Further discussion about possible approaches to improve the health benefits of rice in relation to different production methods is provided in section 7.3.1.1. implications for producers in Chapter 7 of the thesis.

Rice indicating a fair price to farmers results in a 50% premium. However, fair farmer price is, indeed, an uncommon concept among Vietnamese consumers, as food products indicating a fair price to farmers are currently rare in the Vietnamese market. Many participants stated that they had only heard about the concept of fair farmer prices during the study. Yet, the study findings suggest that the concept is appealing to consumers. Future communication messages should further increase consumers' awareness and knowledge of this concept. In addition, consumers' appreciation and WTP for sustainable production methods, such as organic and IPM, might also offer opportunities to improve farmers' income in developing countries (Manaloor et al., 2016).

## **5.7 Conclusions**

This study highlights the potential and promising added value to consumers of organic rice and of rice produced using the IPM production method, as consumers are willing to pay premiums for these types of rice compared to conventionally produced rice. Consumers are also willing to pay extra for rice with claimed health benefits and for rice that guarantees a fair price to farmers. Consumers' knowledge and understanding of sustainable production methods should be enhanced to increase their appreciation for sustainably produced rice. Furthermore, since the concept of fair trade is relatively new to Vietnamese consumers, greater efforts to communicate the meaning of fair trade are recommended to increase consumers' familiarity with this concept. This study faces some limitations. The study sample focused on consumers who live in two major Vietnamese cities which limits generalisation to the overall Vietnamese population. In addition, the study employed CE as a stated preference method which entails the possibility of hypothetical bias. Future research on this topic through revealed preference methods is recommended.





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## Chapter 6. Valuation from experimental auctions

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Results from Chapter 2 (the first data collection in 2015) showed that extrinsic attributes (labelling related aspects) are important in consumers food choices. About a year later, the second data collection was conducted in 2016. During the time in between the two data collection, it was observed that there is a growing interest in traceability aspects of food products in the domestic Vietnamese market. As traceability is one of the extrinsic attributes (related to labelling) that was found as important in the first study (in 2015), we explicated labelling aspects from the first study into traceability in the experimental auction study (which is the second data collection in 2016).

In chapter 5, consumers' preferences and WTP for different food quality attributes and their trade-off between different food quality attributes for rice were investigated, by conducting a choice experiment, which related to more hypothetical settings. In this chapter (Chapter 6), consumers' preferences and WTP for food quality label for rice under different information treatments were elicited through experimental auctions, which employed non-hypothetical and more realistic settings, to account for potential bias associated with hypothetical settings.

This chapter investigates the following research question:

RQ8. How much are consumers are willing to pay for rice with food quality labels under increasing levels of information?

RQ8a. What are the effects of different levels of information referring to quality labelling (certified sustainable production practices (VietGAP)) and other information cues (supplementary information about the certification and traceability) on consumers' WTP for sustainably-produced rice?

RQ8b. What determines consumers' WTP for sustainably-produced rice?

Hypotheses:

Consumers are willing to pay more for rice under increasing levels of information referring to quality labelling (certified sustainable production practices (VietGAP)) and other information cues (supplementary information about the certification and traceability).

This chapter is based on: **My, N. H. D.**, Demont, M., Van Loo, E. J., de Guia, A., Rutsaert, P., Tuan, T. H., & Verbeke, W. (2017). What is the value of sustainably-produced rice? Consumer evidence from experimental auctions in Vietnam. *Food Policy* (Under Review).



## 6.1 Abstract

Little is known about the value of sustainably-produced rice and incentive mechanisms for the adoption of sustainable production standards throughout rice value chains in Southeast Asia. This study investigates how much consumers are willing to pay for rice produced and labelled under a national sustainable production standard in the South of Vietnam through experimental auctions. Domestic consumers are willing to pay a 10% price premium for certified sustainably-produced rice. This premium gradually increases up to 33% when incremental levels of information on certification and traceability are provided. Consumers willing to pay premiums for sustainably-produced rice are more health-conscious, have better knowledge of and greater trust in food quality certification for rice, and tend to be more environmentally conscious and read food labels while purchasing food. Findings suggest that sustainable production labels for rice should be accompanied by supplementary information on certification and traceability to increase consumers' awareness and appreciation of sustainably-produced rice. Promoting certified sustainably-produced rice hence crucially hinges on strengthening consumers' knowledge of and trust in food quality certification. Communication strategies are recommended to focus on the environmental and health benefits of sustainably-produced rice.

**Keywords:** Rice; Sustainability; BDM auction; VietGAP; GlobalG.A.P.; Vietnam

## 6.2 Introduction

Since the publication of the Sustainable Development Goals by the United Nations (UN) (2015), sustainability has been in the forefront of international debates on agricultural production and trade. Whilst most of the discussions have focused on higher-value commodities, the rice sector has generally been neglected, despite its crucial role in providing global food security. In response to this gap, the Sustainable Rice Platform (SRP) released in 2015 the world's first standard for sustainably-produced rice (SRP, 2017). The SRP is a multi-stakeholder platform convened by the UN Environment and the International Rice Research Institute (IRRI) to promote resource-use efficiency and sustainability in the global rice sector. So far, the SRP devoted substantial efforts to developing a standard and a set of performance indicators for sustainable rice cultivation. However, there is still a research gap on the incentive mechanisms that can be deployed to encourage the adoption of sustainable production standards throughout rice value chains.

Different market-based incentive mechanisms have been proposed to encourage the adoption of sustainable production standards throughout rice value chains; i.e. embodying, internalizing<sup>26</sup>, and disembodying<sup>27</sup> sustainability (Demont & Rutsaert, 2017). Sustainability can be embodied in rice products through labelling if farmers comply with sustainable production standards and have their products certified by a third party. The success of a market-based incentive mechanism based on embodying sustainability not only depends on farmers' awareness and willingness to adopt sustainable production standards, but also crucially hinges on consumers' awareness, acceptance and willingness-to-pay (WTP) for rice certified as being "sustainably-produced". However, little is known on consumers' valuation of sustainable production labels in the rice sector in Southeast Asia.

Vietnam is the world's third-largest rice exporter (FAO, 2014a). Hence, its rice production significantly contributes to regional and global food security (Shrestha et al., 2016). However, the latter has largely come at the expense of the environment, questioning the long-term sustainability of this strategy. The Mekong Delta (MKD), the primary rice-producing region of the country, has crucial roles in the agricultural production of the country (which were presented in detail in Chapter 1, the general introduction of the thesis). However, the agricultural production in the MKD is reported to face several challenges relating to the potential negative impacts of climate change and human activities (which were described in detail and emphasized in Chapter 1, the general introduction of the thesis). Hence, one of the important components of Vietnam's restructuring policy strategy of the agricultural sector is promoting sustainable rice production in the MKD (Demont & Rutsaert, 2017).

Demand for food quality labels is growing in the context of Vietnam's rapid economic growth and fast urbanisation (Wang et al., 2014). In response to this demand, several food quality labels are appearing on the domestic food market, such as Hazard Analysis and Critical Control Points (HACCP), good agricultural practices (GAP), and organic food labels. Due to food quality and

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<sup>26</sup> Internalizing sustainability means that the sustainable production standards can be internalized in the value chain through vertical coordination, for example, contract farming (Demont & Rutsaert, 2017). Internalizing sustainability is second approach to obtain more sustainable rice production through private governance.

<sup>27</sup> Disembodying sustainability is the third approach to obtain more sustainable rice production, in the case embodying and internalizing approaches do not work well. Disembodying sustainability refers to a book and claim system that "would allow for the transfer of sustainable rice credits from the supply base to the end user, independent of the physical rice supply chain. A credit buyer acquires credits corresponding to sustainably produced rice. The certified farmer/mill then sells it rice into its existing supply chain as conventionally produced rice" (Demont & Rutsaert, 2017, p.12-13). This approach requires a third party to carry out the governance (Demont & Rutsaert, 2017).

safety concerns, in 2008 the MARD issued the national sustainable production standard “VietGAP” (Vietnamese Good Agricultural Practices), which applies to different crops and products, including rice. VietGAP certification integrates different aspects of food production including safe food cultivation practices, handling and processing, promotion of environmental sustainability and workers’ welfare. GlobalG.A.P. (Global Good Agricultural Practices) is another popular GAP standard for rice in the Vietnamese food market. The organic rice market is still a niche market in Vietnam, mainly serving the metropolitan area. The details of these quality certifications (HACCP, VietGAP, GlobalG.A.P., organic) were presented in Chapter 1 (the general introduction of the thesis).

In Vietnam, the private sector tends to underinvest in labels signalling quality attributes such as food safety, traceability and sustainability of rice production (Demont & Rutsaert, 2017). To assist the private sector’s investment in rice value chain upgrading towards increasing sustainability, this study investigates how much consumers are willing to pay for rice produced and labelled under a national sustainable production standard (VietGAP) in the South of Vietnam through experimental auctions. More specifically, we elicit domestic consumers’ WTP for VietGAP-labelled<sup>28</sup> rice (i.e. embodying sustainability in a national production standard) through experimental auctions. The contribution of this study is twofold. First, to the best of our knowledge, it is the first study which provides evidence of (i) the value of sustainably-produced rice; (ii) the information attributes suppliers need to provide in order to capture that value; and (iii) the characteristics of the market segment of potential buyers of sustainably-produced rice in Southeast Asia. The insights can be deployed by value chain actors and policymakers in terms of developing a food quality certification system for sustainably-produced rice that is reliable, traceable, signals good quality, and has the ability to communicate these credence attributes effectively to consumers. Secondly, this study provides evidence that embodying sustainability in rice products through labelling is a potential market-based incentive mechanism to encourage the adoption of sustainable production standards throughout rice value chains in the context of Southeast Asia. This provides crucial information for the SRP in its mission to promote sustainability in the global rice sector and contributes to achieving the Sustainable Development Goals.

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<sup>28</sup> As indicated in Chapter 1 of the thesis, VietGAP label is referred to sustainable food labels (as one type of food quality labels). Therefore, in this chapter (Chapter 6), rice that is produced under good agricultural practices is referred to as “sustainably-produced rice”.

### 6.3 Conceptual framework

In line with the general conceptual framework of the thesis in Figure 1.2, consistent with the conceptual framework of Chapter 4 (Figure 4.1), and based on the existing literature on consumers' WTP for quality food, including rice, this study embeds consumer valuation of quality certified rice (or sustainably-produced rice as this chapter refers to GAP standard) in a conceptual framework in Figure 6.1. The three components of cognitive, affective and conative and behavioural aspects have been included in the conceptual framework of Chapter 6 (Figure 6.1).

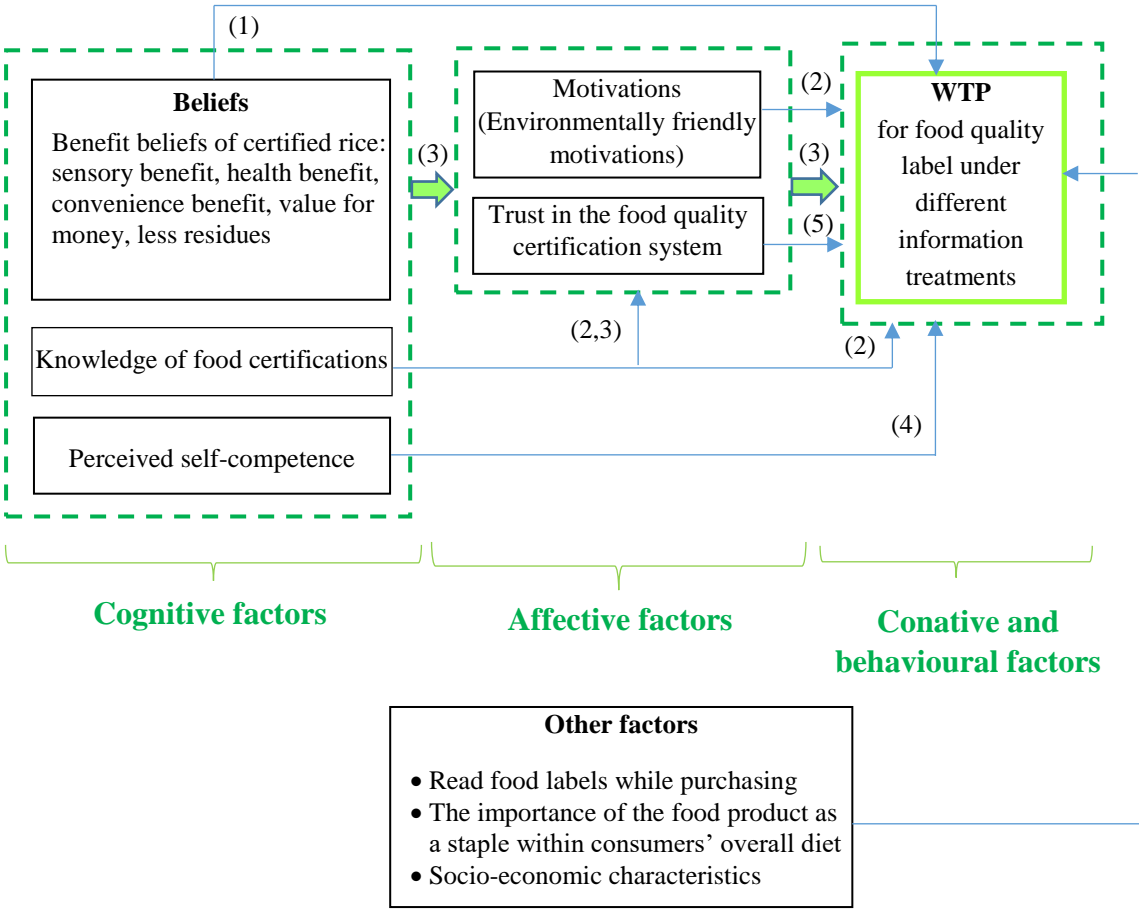


Figure 6.1. Conceptual framework of the study: determinants of consumers' willingness-to-pay for quality-certified rice with different levels of information

(1) Farah et al. (2011), Ergin and Ozsacmaci (2011), Van Loo et al. (2013); (2) Yadav (2016); (3) Lavidge and Steiner (1961); (4) Chryssochoidis (2000); (5) Nuttavuthisit and Thøgersen (2017), Slamet et al. (2016).

Literature of the associations between cognitive factors (knowledge, perceived self-competence, beliefs) and conative and behavioural factors has been illustrated in detail in Chapter 4 of the thesis (section 4.3). In addition, literature of the associations between affective

factors (trust in the food quality certification system, environmentally friendly motivations towards food choices) and conative and behavioural factors has been described in detail in Chapter 4 of the thesis (section 4.3). Also, literature of the associations between other factors such as read food labels while purchasing, the importance of the food product as a staple within consumers' overall diet, and socio-economic characteristics (income, household size, education, age, gender) with conative and behavioural factors has been reported in detail in Chapter 1 of the thesis (section 1.2.4).

## **6.4 Materials and methods**

### *6.4.1 Experimental auction design*

In this study, experimental auctions are conducted to elicit the WTP for VietGAP rice under gradually-increasing information levels. Experimental auctions have been applied to estimate the WTP for rice in previous consumer studies (Akaichi et al., 2017; studies reviewed by Demont & Ndour, 2015; Demont et al., 2017; Depositario et al., 2009; Lee et al., 2014; Peterson et al., 2013). Experimental auctions are preferred over stated preference methods (e.g. contingent valuation) because they are less prone to hypothetical bias and are incentive-compatible (Lusk & Shogren, 2007). In an auction, the WTP is obtained by setting up a real market environment where consumers have the opportunity to exchange real goods with real money. The Becker-DeGroot-Marschak (BDM) auction mechanism (Becker et al., 1964; Lusk & Shogren, 2007) was used to elicit consumers' WTP for rice.

BDM auctions have some advantages compared to stated preference methods and other auction mechanisms such as their ease of implementation (Feldkamp et al., 2005), transparency (Wertenbroch & Skiera, 2002), and flexibility to conduct with individuals or groups (De Groote et al., 2011; Wertenbroch & Skiera, 2002). The practical advantage of BDM auctions with individuals over other auction mechanisms with groups (e.g. Vickrey) is that BDM auctions with individuals more closely reflect real purchase situations as in reality consumers hardly ever bid against (compete) each other in a specific purchase situation (e.g. of grocery foods) as there is rarely a case of limited stocks of goods (Sichtmann & Stingel, 2007). Also, while overbidding bias has been observed in Vickrey auctions (Breidert et al., 2006), the problem seems less prevalent in BDM auctions (Breidert et al., 2006; Wertenbroch & Skiera, 2002). However, similar to other auctions, BDM may have some disadvantages too. Auctions are limited to existing products and cannot be applied for concept design and new product development as in the case of conjoint analysis (Wertenbroch & Skiera, 2002). In the context

of the study of Noussair et al. (2004), for example, BDM auctions were not preferable compared to Vickrey auction. In addition, BDM is a relatively new mechanism that has “limited experience outside the lab” (Berry et al., 2015, p.3) compared to other auction mechanisms. The choice of an appropriate auction mechanism depends on the context and objectives of the study. As “WTP is a situation-specific, individual level construct” (Voelckner, 2006, p.148), BDM is applicable at the point-of-purchase situation. As the BDM mechanism is also incentive compatible (Voelckner, 2006; Wertenbroch & Skiera, 2002), we deemed it to be the most appropriate to realise our research objectives in the local context of our study.

Supermarkets have been reported to play an important role in supplying food products with quality labels in Asia, which is partly driven by increased food safety concerns (Reardon et al., 2012). Therefore, the auction was conducted in a large supermarket in Can Tho, a large city located in the Mekong Delta in the South of Vietnam, in August 2016. This supermarket was selected as it caters a large number of food shoppers on a daily basis and has a large range of food products with quality labels, specifically for rice, compared to other supermarkets in the city. Consumers were approached in the supermarket and screened according to the following inclusion criteria: (i) being the main household food shopper for rice (with the age from 23 years on); and (ii) consuming rice. Participants were asked if they had 10–15 minutes to participate in a small survey. At this stage, no information was provided about receiving an incentive in order to avoid influencing the participation decision. We applied non-probability quota sampling with age, income and education as quota control characteristics, in order to ensure that the sample size and composition of each treatment group matched the distribution in the population and satisfied minimum criteria for statistical analysis (i.e. the envisaged number of participants in each treatment was around 50). A total of 199 participants who satisfied the screening criteria were recruited based on judgement by the interviewers. Participants were assigned to the treatment (or control) groups by the senior researcher who monitored the fieldwork and data collection procedure on-site. Participant recruitment and assignment to treatment groups were based on the quota control characteristics and guided by the completion rates for the different treatment groups.

The BDM auction procedure involved the following steps. Before entering the bidding stage, participants were asked to report their level of hunger. They were then informed of the opportunity to buy a one-kilogram rice package. Next, the BDM auction mechanism was



carefully explained and review questions<sup>29</sup> were asked to ensure that participants had a perfect understanding of it before moving to the auction proper. Participants were given enough time to visually and tactilely inspect the rice. Following Lusk et al. (2004), a single bidding round was used. Participants were requested to bid a positive value or zero in case they did not want to buy the product. Next, participants were provided with the rice package and information flyer corresponding to each treatment (Figure 6.2, and Appendix A7). Four treatments were tested using a between-subjects design in which each consumer bids on a single one-kilogram package of rice. In the control treatment (T0), participants were presented with a plain, unlabelled rice package without supplementary information. In treatment T1, participants were introduced with a rice package labelled as “VietGAP”. Treatment T2 provided consumers with the same labelled rice package as in T1, combined with a flyer presenting supplementary information on VietGAP certification (Appendix A7). The information flyer of VietGAP was based on the VietGAP concept developed by the National Certification Centre of Vietnam (QUACERT, 2016). In treatment T3, participants received the same product and information as in T2, with additional traceability information (Appendix A7). All the rice used in the experimental auctions was produced in accordance with the VietGAP production practices and only factual and truthful information was provided to the study participants, hence no deception was involved in the implementation of the experiment.

Then, participants evaluated the product and submitted their bid. After submitting the bid, participants drew a random price from a box to determine the market price. The randomly drawn prices ranged from the lowest price of similar type of conventional rice observed in the market to double the average market price of the conventional rice. The randomly drawn prices were listed in absolute values and were uniformly distributed from VND7,000 to VND26,000; increments of VND1,000 were used. Participants purchased the rice if their bid equalled or exceeded the randomly drawn price; otherwise, no transaction took place (Feldkamp et al., 2005). Lastly, participants were administered a post-auction survey questionnaire and received a voucher of VND50,000 (US\$2.27) to compensate for their participation time.

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<sup>29</sup> A completely different example, a pack of instant noodles, was used not to influence participants. They were asked some questions related to the bid of a pack of instant noodles (as an example), to make sure that they understood the mechanism properly before moving to the auction.

Treatment	“Label” <sup>a</sup>	“Information” <sup>b</sup>	“Traceability” <sup>c</sup>	Illustration
T0 (n=50)	0	0	0	
T1 (n=49)	1	0	0	
T2 (n=51)	1	1	0	 <p>See Figure A7.1</p>
T3 (n=49)	1	1	1	 <p>See Figure A7.2</p>

Figure 6.2. Overview of the treatments and coding for treatments variables in the experimental auctions (n=199, August 2016)

Note: <sup>a</sup>1 VietGAP label is present, 0 otherwise; <sup>b</sup>1 Supplementary information on certification is provided, 0 otherwise; <sup>c</sup>1 Supplementary information on traceability is provided, 0 otherwise.

#### 6.4.2 Measures

According to Lancaster’s consumer utility theory, consumers derive utility from the characteristics of products (Lancaster, 1966), i.e. consumers attach value to products based on the product attributes. Literature has indicated that extrinsic attributes such as production

method, quality certification, origin and traceability are important in consumers' food choices (Iop et al., 2006; Ubilava & Foster, 2009). In our study, different attributes of rice are considered, including labelling and other information cues. Consumers' valuation for quality labelling (VietGAP quality certification label) and other information cues (supplementary information about the certification and traceability) on rice are elicited via experimental auctions (Lusk & Shogren, 2007). Willingness-to-pay (WTP) is likely influenced by their knowledge about quality labelling, attitudinal and behavioural factors as well as socio-economic characteristics as outlined in the study's conceptual framework (Figure 6.1).

The measures of cognitive variables including knowledge, perceived self-competence; benefit beliefs; affective variables including trust in the food quality certification system, perceived psychological consequences of environmentally friendly behaviour; other variables such as reading of food labels while purchasing, and the importance of the food product as a staple within consumers' overall diet, were described in detail in Chapter 4 of the thesis (section 4.4.1). The composite variables were formulated: sensory benefit (Cronbach's  $\alpha = 0.79$ ), convenience benefit (Cronbach's  $\alpha = 0.62$ ), and health benefit (Cronbach's  $\alpha = 0.87$ ); perceived self-competence (Cronbach's  $\alpha = 0.89$ ); perceived psychological consequences of environmentally friendly behaviour (Cronbach's  $\alpha = 0.71$ ).

Finally, we assessed socio-economic characteristics, including age, gender, presence of young children, education, income and household size. We also controlled for possible effects of having a housemaid (yes/no), daytime effects (morning vs. other moment of the day), and participant's hunger level. Regarding the latter and following Flint et al. (2000) and Hung and Verbeke (2018), participants were asked to report their degree of hunger and satiety on an 11-point scale ranging from "the greatest imaginable degree of hunger" to "the greatest imaginable degree of satiety".

### 6.4.3 Econometric model

Due to a small number of zero values in the bids (less than 4%), we adopt a linear regression model. In addition, we have relatively many explanatory variables, hence, we used a backward stepwise method (removal criteria of  $p > 0.1$ )<sup>30</sup>, similarly as in Takemoto et al. (2017). In addition, the Breusch-Pagan/Cook-Weisberg test was conducted to verify whether the assumption of homoscedasticity is satisfied. The model with robust standard errors should be

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<sup>30</sup> In this method, we start with all the predictors, and then remove the predictor with the highest p-value greater than 0.1, and then refit the model. The procedure was continued until all p-values are less than 0.1.

performed in the case heteroscedasticity is present. To model the relation between the observed  $WTP_i$  and the explanatory variables  $X_i$ , we set up the following linear regression model:

$$WTP_i = \beta_0 + \beta_i X_i + \varepsilon_i \quad (6.1)$$

where  $WTP_i$  is the bid value for rice of the  $i^{th}$  participant;  $X_i$  is a vector of explanatory variables including three dummy variables of treatment effects, and other variables such as the time of the day during which the auction was organised and the hunger level, attitudes and behaviour in relation to quality-certified rice, and the socio-economic profile of the participant;  $\beta_0$  is a constant;  $\beta_i$  is a vector of coefficients;  $\varepsilon_i$  is the residual.

The effect of the information treatments is estimated by using three dummy variables to capture the added value of incremental information provided by each of the treatments: “Label”, “Information”, and “Traceability” (Figure 6.2). The control is applied when the three dummies have a value of zero. In T1, “Label” has a value of 1 indicating that the VietGAP label is present without further information. Hence, “Label” only captures the effect of the label, relative to the unlabelled, plain package. In T2, “Label” and “Information” both have a value of 1 indicating the presence of both the VietGAP label and additional VietGAP information. Since “Label” already captures the effect of the label, “Information” now captures the incremental effect of the supplementary VietGAP information. In T3, all the three dummies have a value of 1 indicating the presence of the VietGAP label, VietGAP information, and traceability information. Similarly, “Traceability” captures the incremental effect of the supplementary traceability information on top of the other pieces of information (label and VietGAP information). The data was analysed using STATA 13.0 and SPSS 24.0 (SPSS Inc., Chicago, IL, USA).

## 6.5 Results

### 6.5.1 Descriptive statistics

Descriptive statistics of the variables and characteristics of the sample are provided in Table 6.1. The sample is dominated by women (86%), who are the main food shoppers in Vietnamese households. Participants from the age of 23 years on were targeted in this study. At the age from 23 years, people likely finish their studies, have jobs, start their independent life, have their own family, have more purchase experience for rice, and are more familiar with information relating to rice purchase. These characteristics are important and were taken into account in the study because the experimental auction involved in product evaluation and required real payment. By targeting the population from 23 years, this study aims to provide

more targeted implications and managerial implications for policy actors in terms of an effective marketing strategy for quality rice. The age of participants ranged from 25 to 70 years and the average age is 45 years<sup>31</sup>. Around 36% of the participants have a university or higher degree, 16% have a college degree (not university), 27% have a high school degree, and the remaining 21% have a secondary school degree or lower level. Approximately 48% of the participants belong to the upper-middle income class which includes those who reported to have an income from “more than average” to “well-off”. Additionally, 64% of the participants reported to have children aged under 15 years in the family. Finally, the average household size of the study sample is more than four persons. There are relatively balance of socio-economic characteristics across different treatments (Table A8.1, Appendix A8).

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<sup>31</sup> As we targeted participants from the age of 23 years on, our sample is a bit older than the population on average. From our sample, 10.6%, 68.8%, 20.6% are in the age groups  $\leq 30$ , 31-54, and  $\geq 55$  years, respectively. From the country population including those from 25 years on, 15.6%, 59.4%, 25.0% are in the age groups  $\leq 30$ , 31-54, and  $\geq 55$  years, respectively (GSO (2014), and own calculation, Table A4.1, Appendix A4).

Table 6.1. Description of variables and descriptive characteristics of the sample  
(n=199, August 2016)

Variable	Description	Unit	Mean (Std. dev.)
<b>Cognitive factors</b>			
Knowledge	Knowledge of food quality certifications for rice	1 = have all answers correct; 0 = otherwise	0.62 (0.49)
Self-competence	Perceived self-competence in identifying certified rice	From 1 = strongly disagree to 7 = strongly agree	4.38 (1.37)
Sensory benefit	Belief in the sensory appeal of GAP-certified rice	From 1 = much worse to 7 = much better	5.54 (0.72)
Health benefit	Belief in the health benefits of GAP-certified rice	From 1 = much worse to 7 = much better	5.84 (0.77)
Convenience benefit	Belief in the convenience of GAP-certified rice	From 1 = much worse to 7 = much better	4.51 (0.87)
Value for money	Belief that GAP-certified rice is good value for money	From 1 = much worse to 7 = much better	4.54 (1.50)
Less residues	Belief that GAP-certified rice has much less residue	1 = much better (less residue compared to conventional rice); 0 = otherwise	0.46 (0.49)
<b>Affective factors</b>			
Trust in the food quality certification system	Trust in the food quality certification system for rice	1 = completely trust; 0 = otherwise	0.24 (0.43)
Environment	Perceived psychological consequences of environmentally friendly behaviour	From 1 = strongly disagree to 7 = strongly agree	6.63 (0.41)
<b>Other factors</b>			
Read food labels	Reading of food labels while purchasing food	1 = often read the label; 0 = otherwise	0.82 (0.38)
Consumption of rice	The importance of the food product as a staple within consumers' overall diet	1 = daily consume rice; 0 = otherwise	0.79 (0.41)
Age	Age of the respondent	Years	45.38 (10.40)
Children	Having children under 15	1 = yes; 0 = otherwise	0.64 (0.48)
Education	Education of the participant	1 = elementary and lower; 2 = secondary; 3 = high school; 4 = higher education (not university); 5 = university and upper	3.61 (1.28)
Income	Self-reported income of the respondent	1 = upper-middle; 0 = otherwise	0.48 (0.50)
Household size	Number of members live in the same household	Persons	4.44 (1.72)
Housemaid	Having housemaid	1 = yes; 0 = otherwise	0.08 (0.26)
Daytime effect (morning)	Time conduct	1 = morning; 0 = otherwise	0.41 (0.49)
Hunger level	The level of hunger of respondent	From 1 = greatest imaginable hungry to 11 = greatest imaginable of satiety	6.25 (1.27)
Gender	Gender of the respondent	1 = female; 0 = otherwise	0.86 (0.34)

For sensory benefit, convenience benefit, value for money n=198; for health benefit n=197.

### 6.5.2 Bids across treatments

Descriptive statistics of the bids are summarized in Table 6.2. Results indicate that the mean values of the bids gradually increase over incremental information treatments. The plain and unlabelled package (T0) received the lowest bid, i.e. VND12,420 (US\$56). The mean WTP increases to VND13,920 (US\$63) when the package features the VietGAP label (T1), and further to VND15,630 (US\$71) when supplementary information on VietGAP certification is provided (T2), and finally to VND16,780 (US\$76) when supplementary information on both VietGAP certification and traceability is provided (T3). This suggests that the value of sustainably-produced rice, as perceived by consumers and revealed through their WTP, is gradually built with incremental pieces of information received.

Table 6.2. Descriptive statistics of the bids across information treatments  
(in VND1,000/kg) (August 2016)

Treatment	n	Mean (Std. dev)	Min	Max	% of zero bids
T0: Control (plain package, unlabelled and no information)	50	12.42 <sup>a</sup> (3.38)	0.00	20.00	4.0
T1: VietGAP label	49	13.92 <sup>a,b</sup> (3.52)	0.00	19.00	4.1
T2: VietGAP label and supplementary information on certification	51	15.63 <sup>b,c</sup> (3.12)	0.00	25.00	2.0
T3: VietGAP label and supplementary information on certification and traceability	49	16.78 <sup>c</sup> (3.56)	0.00	26.00	2.0

Note: US\$1 = VND22,011 in August 2016. Sample size n=199.

<sup>a, b, c</sup> indicate significantly different means using ANOVA and Bonferroni Post Hoc Test.

### 6.5.3 Determinants of WTP

The Breusch-Pagan/Cook-Weisberg test indicates that the assumption of homoscedasticity is not satisfied and thus robust standard errors were estimated. Results of the backward elimination method (removal criteria of  $p > 0.1$ )<sup>32</sup>, similarly as in Takemoto et al. (2017), are reported in Table 6.3. There is no concern of multicollinearity as the Variance Inflation Factor (VIF) values of all explanatory variables are less than 10. The percentage premiums were calculated from the dummies in Table 6.3. The dummies “Label”, “Information”, and “Traceability” are significant at the 1–10% level, confirming that each piece of incremental information adds value to sustainably-produced rice (Table 6.3). The VietGAP label (T1) tends to add VND1,237 (US\$6) or 10% price premium relative to the unlabelled package (T0), which was valued at VND12,420<sup>33</sup> (US\$56). The supplementary information on VietGAP

<sup>32</sup> Tobit model produced similar results to the linear regression model (Equation 6.1) with removal criteria of  $p > 0.1$ .

<sup>33</sup> This price of the unlabelled and plain package can be seen in T0 in Table 6.2.

certification (T2) further adds VND1,716 (US¢8) or 14%, and traceability information adds another VND1,198 (US¢5) or 10% to the value of the unlabelled package. The total price premium for the VietGAP-labelled package with supplementary information on VietGAP certification and traceability (T3) amounts to VND4,151 (US¢19) or a premium of 33% of the value of the unlabelled package.

Table 6.3 provides information on the characteristics of the market segment of potential buyers of sustainably-produced rice. Interpretation of each significant variable in the model is done while holding all other variables constant. First, except for evidence of an income effect, we do not find a significant influence of socio-economic characteristics on WTP. Consumers in the upper-middle income segment are willing to pay VND911 (US¢4) or 7% more for quality rice than consumers in the medium and lower income segment, which is consistent with other studies (Cuevas et al., 2016; Demont et al., 2012; Diagne et al., 2017; Peterson et al., 2013), and with economic theory (Vandeplas & Minten, 2015). Secondly, consumers who believe that GAP-certified rice is good value for money tend to be willing to pay VND304 (US¢1) or 2% more per unit increase on the 7-point belief scale<sup>34</sup>. Thirdly, consumers who completely trust or are knowledgeable about food quality certification for rice are willing to pay VND1,191–1,336 (US¢5–6) or 10-11% higher price premiums than those who do not completely trust or are not fully knowledgeable about the certification system. Fourth, consumers who believe that sustainably-produced rice provides health benefits, are willing to pay VND767 (US¢3) or 6% more per unit increase on the 7-point scale representing the strength of their health benefit beliefs<sup>35</sup>. Fifth, consumers' bids tend to increase by VND1,026 (US¢5) or 8% for each unit increase on their 7-point belief scale of perceived psychological consequences of environmentally friendly behaviour<sup>36</sup>. Finally, consumers who often or always read food labels while purchasing food tend to pay VND1,288 (US¢6) or 10% price premiums relative to those who do not often or always read food labels.

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<sup>34</sup> The measure for the variable “belief in value for money” was presented in section 4.4.1 in Chapter 4.

<sup>35</sup> The measures for the variable “belief in health benefits” were presented in section 4.4.1 in Chapter 4.

<sup>36</sup> The measures for the variable “perceived psychological consequences of environmentally friendly behaviour” were presented in section 4.4.1 in Chapter 4.



Table 6.3. Results of the regression of the determinants of WTP (VND1,000/kg) for quality-certified rice (August 2016)

	Coefficient (Robust Standard error)	t	p-value
<b>Treatments</b>			
Label	1.237 (0.638)*	1.94	0.054
Information	1.716 (0.579)***	2.96	0.003
Traceability	1.198 (0.601)**	1.99	0.048
<b>Cognitive factors</b>			
Knowledge	1.336 (0.507)***	2.64	0.009
Health benefit	0.767 (0.257)***	1.96	0.003
Value for money	0.304 (0.155)*	1.75	0.052
<b>Affective factors</b>			
Trust in the food quality certification system	1.191 (0.464)**	2.57	0.011
Environment	1.026 (0.587)*	2.33	0.082
<b>Other factors</b>			
Read food labels	1.288 (0.707)*	2.98	0.070
Income	0.911 (0.390)**	1.82	0.021
Constant	-2.676 (4.333)	-0.62	0.538

Note: US\$1 = VND22,011 in August 2016. Standard errors are in parentheses. \*\*\*, \*\*, \* represent significance at 0.01, 0.05, and 0.10 level, respectively. Sample size n=194, R<sup>2</sup>=0.41. p-values were calculated based on robust standard errors because homoscedasticity was not satisfied (Breusch-Pagan/Cook-Weisberg test: p-value<0.001). The Tobit model yielded similar results.

## 6.6 Discussion and policy recommendations

### 6.6.1 Discussion

Little is known about consumers' valuation of sustainable production labels in the rice sector in Southeast Asia. We used BDM auctions to estimate consumers' WTP for certified sustainably-produced rice in the South of Vietnam. Our findings indicate that sustainable production labels for rice should be accompanied by supplementary information on certification and traceability to strengthen consumers' awareness and valuation of sustainably-produced rice. There is a growing interest in food products produced under environmentally friendly conditions, that meet food quality and safety standards, and promote social welfare. Our findings are consistent with previous studies indicating WTP premiums for rice that follows sustainable production methods such as organic rice (Sriwaranun et al., 2015), or eco-friendly

rice (Akaichi et al., 2017; Lee et al., 2014). Our observation that consumers tend to be willing to pay a premium for traceability information is similar to the finding of Wu et al. (2015). The price premiums recorded purely for the VietGAP label (i.e. without supplementary information) are lower than the ones observed in the market for certified rice products, which vary among certification schemes (GlobalG.A.P. or VietGAP), as well as among brands. This external validity check suggests that our BDM auctions have not generated overbidding bias, which is consistent with the literature (Breidert et al., 2006; Wertenbroch & Skiera, 2002). Similar to Rodríguez et al. (2009), we find that consumers who often or always read food labels while purchasing food have a higher WTP. It is observed that currently, most certified rice labels in the Vietnamese food market still do not provide adequate and appropriate information about the certification schemes to consumers. As a result, consumers are still somewhat reluctant to purchase these rice products. Results of our study provide implications for agricultural policy, communication strategies, international trade, public and private marketing strategies for rice in Vietnam.

#### *6.6.2 Implications for agricultural policy*

This study is one of the first on consumer preferences for rice with a sustainable label in a developing country such as Vietnam. It comes at a moment characterised by an enormous interest in increasing sustainability of the national rice sector by the Vietnamese government. Since September 2017, negative impacts of climate change and human activities are recognised by the Vietnamese government as the most important challenges for agricultural production in the Mekong Delta of Vietnam (VgpNews, 2017a; VgpNews, 2017b; VietnamNews, 2017). Thus, in this context, studies towards consumers' preferences for sustainably-produced rice are extremely important to provide further insights into sustainable rice value chain upgrading in Vietnam. VietGAP is a national food quality standard referring not only to quality and safety aspects, but also to sustainability aspects. This study provides evidence about the value Vietnamese consumers place on this label on the domestic market, which might be crucial in convincing farmers, suppliers and food and agriculture value chain actors to adopt more sustainable practices. Future research should address whether there are opportunities for international export markets as well (see below).

#### *6.6.3 Implications for communication strategies*

The gradual build-up of value of sustainably-produced rice has important implications for communication strategies by policymakers. Promoting sustainably-produced rice crucially hinges on providing consumers with adequate information on standards, quality assurance, and

traceability, which reduces information asymmetry and enhances consumers' trust in the product (Meyer et al., 2012).

This study recommends that proper and effective information provision about food quality assurances to consumers is vital to increase their appreciation of sustainably-produced rice. Information should be meaningful, relevant, selective, trustworthy, and easy for consumers to understand and remember. To effectively provide the information, it is necessary to establish transparent and credible information channels for food quality certification that consumers can access and refer to when purchasing rice which can further contribute to enhancing consumers' trust. In the context of unclear and inappropriate information provision on food labels for rice in Vietnam, there is a need to build a unified logo for the certified sustainably-produced rice. The discussion towards issuing this logo has been provided in detail in the discussion of Chapter 2 of the thesis. Importantly, in order to increase consumers' trust in the food quality certification system for sustainably-produced rice, it is advisable to regularly monitor and strictly inspect the information related to quality-certified rice being provided to consumers. Therefore, policymakers are recommended to make significant efforts to develop a mechanism that can regulate the credibility of information that is provided to consumers on food quality labels.

#### *6.6.4 Implications for international trade*

Results of our study indicate that there may be opportunities to promote sustainably-produced rice in the domestic market. More importantly, since rice is an important agricultural export product of Vietnam, it is suggested to conduct valuation studies for quality rice not only in Vietnam but also in high-income target markets of Vietnam's rice industry such as Hong Kong and the European Union (EU). Vietnam ranked second among the major rice suppliers to Hong Kong in 2013 and Vietnamese rice amounted to 41% of the market share of rice in Hong Kong in the same year (USDA, 2014). Additionally, Vietnam's rice industry is expected to gain benefits from trade agreements between Hong Kong and Vietnam (Vietnam Business Forum, 2016). The EU is another potential market for Vietnam's rice as rice is among the top-20 agricultural commodities that EU countries import from Vietnam (EUROPA, 2017). Promisingly, the EU has offered tariff elimination for a large amount of Vietnam's rice exports to EU (EUROPA, 2016). Studies of consumers' valuation of sustainably-produced rice in potential markets such as Hong Kong and the EU can provide insights into strategies for increasing the competitiveness of Vietnamese rice in export markets.

### *6.6.5 Implications for public and private marketing strategies*

Results of our study indicate that information on the food quality label plays an important role in consumers' appreciation of sustainably-produced rice. However, the private sector in Vietnam currently does not yet adequately invest in product quality standards for rice (Demont & Rutsaert, 2017). Consequently, more efforts should be done to encourage the private sector to invest in concretising the product quality standards of sustainably-produced rice. The government is recommended to take initiatives to encourage the private sector's investment in product quality assurance by providing more incentives and support mechanisms to assist the private sector in adopting quality standards for their products. Our study shows that consumers' knowledge of food quality certifications may influence their appreciation and WTP for sustainably-produced rice. Thus, public marketing policies that aim to improve consumers' awareness of the quality and safety standards such as VietGAP are highly encouraged. This can be done via public communication (e.g. official TV programs, talk shows, fairs) attended by representatives from the government, experts in the field and producers sharing their knowledge about sustainable agriculture and the costs and benefits associated with good agricultural practices. The government can also organise a platform or a forum where people (government, experts, producers, consumers) can share their knowledge and ideas about sustainably-produced foods.

In terms of private marketing policies, our results indicate that rice producers and companies should focus on adopting food quality standards for their products and properly communicate information about food quality certification to consumers (i.e. following the government regulations to apply a unified logo for sustainably-produced foods, once this unified logo is established; ensuring the credibility and trustworthiness of their communication). Consistent with previous studies (De Steur et al., 2012a; 2017b; Mondelaers et al., 2009; Yin et al., 2010), we find that the value of sustainably-produced rice is strongly affected by consumers' belief in the health benefits of the product, such as the amount of vitamins and minerals, fibre, and its nutritional content. In addition, consumers who are willing to pay premiums tend to be more environmentally conscious (Abdul-Muhmin, 2007; Yadav, 2016). These findings suggest that credible and properly governed health and environmental benefits claims should be incorporated in the communication messages to reinforce consumers' belief in the health and environmental benefits of certified sustainably-produced rice, and consequently increasing consumers' appreciation of sustainably-produced rice. In addition, our study shows that consumers in the upper-middle income segment are willing to pay more for sustainably-

produced rice. This segment herewith emerges as a primary target group for marketers of the rice industry and their marketing strategy for quality rice.

## **6.7 Conclusions**

The findings of our study suggest that embodying sustainability in rice products through labelling is one of the potential market-based incentive mechanisms that can be used to improve sustainability in rice value chains in Vietnam. This has important implications for the SRP, which may be encouraged to pilot test similar certification schemes in other Southeast Asian and South Asian rice growing countries. However, since some of these countries are major exporters, it remains to be seen whether the demand for sustainability in domestic rice markets can be large enough to trigger the adoption of sustainability standards throughout rice value chains. However, supermarkets may play a market leader role in this trend (Reardon et al., 2012), which may spillover to other markets.

Our results also provide crucial insights for Vietnam's rice sector's restructuring strategy. In their quest to increase quality-competitiveness, sustainability and resilience of the sector against climate change, policymakers could partner with the SRP to train Vietnamese rice value chain actors — not only farmers — in the implementation of sustainable production practices throughout rice value chains. The willingness-to-pay among consumers – as demonstrated by the empirical findings of this study – can trigger the adoption of sustainable production practices. Policymakers and value chain actors could further inform domestic consumers about the societal benefits of sustainable rice production in the Mekong Delta and trigger demand for sustainably-produced rice. Our results suggest that consumers value sustainably-produced rice as long as they are properly informed about the certification and the origin of the product they are buying. Importantly, it is crucial to provide proper information about the certification and traceability of the product to increase the positive effect of information provision on consumers' appreciation of sustainably-produced rice.

Finally, this study has some limitations such as the higher prevalence of women in the sample compared to men; yet, women are predominantly responsible for household food purchase. The study focused on urban consumers in a large Vietnamese city in the MKD, which limits generalisation of the results to the overall Vietnamese population. The implications of the study should be projected to supermarket shoppers but are limited to our sample frame. The limitations associated with sampling and self-reported measures are discussed in further detail in section 7.1.2.1 and section 7.1.2.2 in Chapter 7 of the thesis. This study would benefit from being reproduced in other Southeast Asian and South Asian countries. Further studies on the role and effect of certification parties such as public or private standards on the WTP for quality rice are also recommended.



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## **Part Five.**

### **General discussion and conclusions**

#### **Chapter 7. General discussion and conclusions**

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In Part Five, based on the results of the previous empirical chapters, Chapter 7 presents the general discussion and conclusion of the thesis. This chapter provides the general discussion and further review of the conceptual framework of the thesis. The limitations of the study are discussed. The implications for different value chain actors, policymakers and further research are provided. Finally, the conclusions of the thesis are presented.





## **7.1 General discussion**

### *7.1.1. Revisiting the conceptual framework*

This thesis investigates consumers' attitudes and behaviour towards food produced under quality labelling schemes in the context of urban areas in Vietnam. The thesis focused on four research objectives and eight research questions as mentioned in Chapter 1 of the thesis. This section provides a general discussion and further review of the research questions in the conceptual framework of the thesis.

#### *7.1.1.1 Research questions RQ1 and RQ2*

The first two research questions were explored in Chapter 2.

RQ1. What is the association between consumers' perceived importance of intrinsic and extrinsic quality cues and their purchase intentions towards food with quality labels?

RQ2. What types of consumer segments can be distinguished based on their perceived importance of intrinsic and extrinsic quality cues? To what extent do consumer segments use, and trust in, different sources of information when buying food?

Chapter 2 provided insight into important aspects (as background information) when studying consumers' attitudes and behaviour towards food with quality labels in Vietnam. The associations between consumers' perceived importance of food quality attributes (i.e. perceived intrinsic and extrinsic attributes) and their purchase intentions towards high quality rice and safe vegetables were explored. Findings from Chapter 2 showed that consumers' perceived importance of intrinsic attributes (safety, quality, health, trustworthiness) were positively associated with their purchase intentions towards food with quality labels for rice and for vegetables. This is in line with previous studies (Dowd & Burke, 2013; Slamet et al., 2016; Teng et al., 2011; Wee et al., 2014; Yin et al., 2010). In addition, perceived importance of extrinsic attributes (product labelling and packaging) were positively associated with their purchase intentions towards food with quality labels for rice and for vegetables. This is in the same manner as the literature (Ibitoye et al., 2014; Farah et al., 2011; Jeddi & Zaiem, 2010; Sakar et al., 2015; Schnettler et al., 2008). These findings emphasize that it is important to focus on intrinsic aspects (safety, quality, health, trustworthiness) and extrinsic aspects (product labelling and packaging) to better understand consumers' attitudes and behaviour towards food with quality labels in the Vietnamese food market. This result also confirms our hypotheses

about the associations between consumers' perceived importance of food quality attributes and their purchase intentions towards quality foods within the conceptual framework of the thesis.

Consumers tend to use information from supermarkets and TV relatively often when purchasing food. More specifically, communication via supermarkets to reach certain target markets is promising, as supermarkets can play multiple roles, such as a distribution channel, a service channel and a communication channel (West et al., 2015). Thus, marketers should carefully consider this advantage and design relevant communication for consumers who do their food shopping at supermarkets. In addition to supermarkets, communication of food safety information should also be conducted on TV or other mass media to reach a larger proportion of consumers. Depending on the target segments and the resources of the companies, appropriate communication strategy can be applied. It is also important to take into account the information sources that are used and trusted by consumers (Table 2.14), as indicated in the discussion of Chapter 2 of the thesis. Furthermore, it is important to develop and implement a policy that effectively controls and regulates the credibility of information provided by supermarkets, mass media and other channels to avoid misleading information and to enhance consumers' trust in the food quality labels.

In the next chapters, consumers' attitudes (Chapter 3) and behaviour (Chapter 4) towards food with quality labels were investigated. Research questions 3, 4 and 5 were explored in Chapter 3.

#### *7.1.1.2 Research questions RQ3, RQ4, RQ5*

RQ3. To what extent are consumers aware of food quality-related terms?

RQ4. To what extent are consumers familiar with different food quality certifications in the Vietnamese food market? What are the characteristics of consumers who are familiar and unfamiliar with food quality certifications?

RQ5. What is the association between consumers' food choice motives and their attitudes towards quality-certified foods?

In Chapter 3, consumers' familiarity with, and their attitudes towards, food with quality labels were further explored. The potential determinants of consumers' attitudes towards quality rice, as well as towards safe vegetables, were investigated. Results showed that consumers' awareness of food quality-related terms was relatively low. Consumers' familiarity with different food quality certifications was also low. The study showed that consumers who were

familiar and those who were unfamiliar with food quality certifications had different characteristics. Consumers who were familiar with food quality certifications tend to have better knowledge, more positive attitudes, higher motivation (i.e. perceived importance of environmentally friendly behaviour relating to the purchase of food quality labels, food safety concern, and perceived importance of healthy eating) towards food with quality labels. These results are in line with our hypotheses. Bialkova and van Trijp (2010) also indicated that familiarity with food labels (such as some types of logos) is an important driver of consumers' attention to food labels. Also, consumers' familiarity with food labels is affected by exposure times and prior knowledge of the labels (Bialkova & van Trijp, 2010). Results showed that consumers who were familiar with food quality certifications tend to have more positive attitudes and perceptions towards quality food. Thus, consumers' awareness and knowledge towards food quality certifications should be significantly improved in order to increase their familiarity with food quality certifications and consequently encourage more positive attitudes towards quality foods and stronger motivations for purchasing quality foods.

Results showed that consumers' perceived importance of environmentally friendly behaviour relating to the purchase of high quality rice, food safety concern, and the perceived importance of rice for healthy eating were positively associated with consumers' attitudes towards high quality rice. These results are in line with previous studies (Lee & Hwang, 2016; Voon et al., 2011; Yadav & Pathak, 2016) and confirmed our hypotheses in the case of rice. The same results were found for factors that were associated with consumers' attitudes towards safe vegetables, except for the perceived importance of vegetables for healthy eating. However, this result does not necessarily mean that perceived importance of vegetables for healthy eating is not important in assessing consumers' attitudes and behaviour towards vegetables. Nevertheless, the increasing prevalence of messages about the safety risks of different types of food, including vegetables, via different communication means in recent years makes the safety aspects of vegetables become more salient in consumers' minds. Consequently, the safety aspects of vegetables outweigh the perceived importance of healthy eating as a driver of consumers' attitudes towards safe vegetables. Food safety concern was indeed indicated to have a positive influence on the WTP for safe vegetables in Vietnam (Mergenthaler et al., 2009). Also, the increasing number of officially reported food poisoning cases in Vietnam during 2000-2012 (Table 1.1, general introduction) (VFA, 2000-2012) confirmed that food safety is an extremely important issue in Vietnam. This calls for urgent action to improve food quality and safety in the country. With increasing income and rapid urbanisation, Vietnamese

consumers have shown an increasing interest in food with quality labels (Wang et al., 2014). Also, there is growing consumer concern about food safety issues in the country (Sarter et al., 2014; Wertheim-Heck et al., 2014). In this context, our results, therefore, emphasize that the safety aspects of food products should be significantly improved.

Hence, in the case of vegetables, our hypothesis about the positive association between the perceived importance of vegetables for healthy eating and consumers' attitudes towards safe vegetables has not yet been confirmed. This implies that the link between the perceived importance of vegetables for healthy eating and consumers' attitudes towards safe vegetables in the conceptual framework (applied in the case of safe vegetables) should be further verified under different conditions, such as the investigation of this relationship in the context where substantial messages about unsafe food exist (via different communication means) and in the case where there are less substantial messages relating to unsafe food. The latter refers to the context when the food safety situation is improved, hence, the number of unsafe food messages via communication means may be reduced.

#### *7.1.1.3 Research question RQ6*

Chapter 4 further examined the drivers of consumer purchase behaviour towards food with quality labels for rice. Research question 6 was explored in this chapter.

RQ6. What determines consumer purchase behaviour towards quality-certified food?

Findings showed that consumers who purchase quality-certified rice tend to have stronger beliefs in the sensory aspects (in line with Tsakiridou et al., 2008; Van Loo et al., 2013), health benefits (in line with Ergin & Ozsacmaci, 2011; Yin et al., 2010), convenience characteristics (in line with Ergin & Ozsacmaci, 2011; Kouy et al., 2016; Pomsanam et al., 2014), and value for money (similar as in Van Loo et al., 2013; Slamet et al., 2016) of certified rice (compared to conventional rice) than those who do not purchase quality-certified rice. The study also showed that those who completely trust in the food quality certification system have a higher probability of buying quality-certified rice. Also, the buyers of quality-certified rice have higher perceived self-competence in distinguishing certified rice from conventional rice. In addition, consumers who purchase quality-certified rice tend to be in the upper-middle income segment. These results support our hypotheses.

In line with Gracia and de Magistris (2007), we did not find a direct association between consumers' knowledge and their purchase behaviour towards quality-certified rice. Hence, our hypothesis about the association between consumers' knowledge and their purchase behaviour

towards quality rice was not confirmed. However, this does not necessarily mean that consumers' knowledge is not an important factor in assessing consumer purchase behaviour towards quality rice. It is more likely that, although objective knowledge is an important aspect, the sole inclusion of objective knowledge is not a comprehensive approach in the analysis of consumers' purchase behaviour towards quality-certified rice. This is the first consumer study on rice that assesses both the effects of consumers' objective knowledge and their perceived self-competence (in identifying certified rice) on consumers' purchase behaviour in the context of developing countries. We found that perceived self-competence has a positive influence on consumers' food choices, which is similar to the literature (Chryssochoidis, 2000; Teng & Lu, 2016). The finding that consumers' perceived self-competence in identifying certified rice is an important determinant of consumer purchase behaviour towards certified rice contributes to verifying the link between consumers' perceived self-competence and their purchase behaviour towards quality rice within the conceptual framework of the thesis. Furthermore, this finding contributes to the limited existing literature regarding this aspect in consumer studies on rice in the context of the developing world. Future studies that include both objective knowledge and consumers' perceived self-competence are highly recommended to explore factors that influence consumers' food choices.

In the subsequent chapters, consumers' preferences and WTP for quality rice attributes (Chapter 5) and WTP for quality rice under increasing levels of information referring to sustainable production practices and traceability (Chapter 6) were investigated respectively.

#### *7.1.1.4 Research questions RQ7 and RQ8*

RQ7. How much are consumers willing to pay for quality rice attributes?

RQ7a. How much are consumers willing to pay for rice that is produced under sustainable production methods (organic, IPM)?

RQ7b. How much are consumers willing to pay for rice with claimed health benefits?

RQ7c. How much are consumers willing to pay for rice that guarantees a fair price for farmers?

Chapter 5 explored research question 7 about consumers' WTP for quality rice attributes, by conducting a choice experiment. Consistent with the literature in developing and emerging countries (Kavoosi-Kalashami & Heydari-Shalmani, 2014; Sriwaranun et al., 2015; Vidogbéna et al., 2015), findings from Chapter 5 showed that consumers were willing to pay more for rice

produced under sustainable production methods, such as organic and IPM. In line with Depositario et al. (2009) and De Steur et al. (2012a), the study found that consumers were willing to pay more for rice with claimed health benefits. Furthermore, similar to Garcia-Yi (2015), the study found that consumers were willing to pay more for rice that guarantees a fair price to farmers. These results confirm our hypotheses about consumers' preferences for different quality rice attributes. The results highlight that sustainably-produced rice (organic, IPM), rice with claimed health benefits, and rice that guarantees a fair price to farmers have potential opportunities in the domestic food market in Vietnam. Noticeably, a fair price for farmers is an uncommon concept among Vietnamese consumers. In addition, there are few food products in the market that clearly indicate a fair price to farmers. Thus, Vietnamese consumers are likely not yet familiar with the concept of fair farmer prices. Hence, further communication of the meaning of fair farmer prices may contribute to increasing consumers' awareness and understanding of this attribute. These results contribute to the limited existing literature concerning valuation studies on consumers' preferences for quality rice attributes in developing countries such as Vietnam.

RQ8. How much are consumers are willing to pay for rice with food quality labels under increasing levels of information?

RQ8a. What are the effects of different levels of information referring to quality labelling (certified sustainable production practices (VietGAP)) and other information cues (supplementary information about the certification and traceability) on consumers' WTP for sustainably-produced rice?

RQ8b. What determines consumers' WTP for sustainably-produced rice?

The final research question 8 was explored in Chapter 6. In Chapter 6, consumers' WTP for rice under increasing levels of information were investigated using experimental auctions. Results from Chapter 6 showed that consumers were willing to pay more for sustainably-produced rice under increasing levels of information referring to sustainable production practices and traceability. Consistent with the literature on consumer WTP for rice that is produced under environmentally friendly production methods (Akaichi et al., 2017; Lee et al., 2014; Sriwaranun et al., 2015), the study showed that consumers were willing to pay more for sustainably-produced rice with information referring to sustainable production practices. In line with Wu et al. (2015), the study found that consumers tend to be willing to pay more for rice with traceability information. These results confirm our hypotheses about consumer preferences and WTP for rice under increasing levels of information, which includes quality labelling

(certified sustainable production practices (VietGAP)) and other information cues (supplementary information about the certification and traceability), in a developing country such as Vietnam. Importantly, these findings highlight that communication about the quality standard (such as VietGAP) and the meaning of the quality standard (i.e. the meaning of VietGAP) in a selective and relevant way is promising in terms of adding value to rice products. In addition, information on traceability should be provided to consumers, as this can provide additional value over the inclusion of the quality standard itself (VietGAP label and the meaning of VietGAP). Importantly, the information relating to traceability should be clear and sufficient, while not overloading consumers with unnecessary information. The study also showed that consumers who are more health conscious (in line with Çabuk et al., 2014; Kapuge, 2016; Salleh et al., 2010; Yadav, 2016), environmentally conscious (in line with Slamet et al., 2016; Yadav, 2016) and believe in the value for money (in line with Van Loo et al., 2013; Slamet et al., 2016) of certified rice tend to pay higher premiums. In addition, those who have better knowledge of, and higher trust in, the food quality certification system, and often read food labels while purchasing food tend to pay higher premiums. These results confirmed our hypotheses.

#### *7.1.1.5 Comparison of WTP values across studies*

In this section, the WTP values from Chapter 5 and Chapter 6 are further corroborated and compared with each other, and with the market prices where relevant. In addition, the self-reported price in Chapter 3 is compared with the price of conventional rice.

Chapter 5 used a choice experiment (a stated preference method) to estimate consumer WTP for rice with different quality attributes including sustainable production methods (organic, IPM), rice with claimed health benefits, and rice that guarantees a fair price to farmers. Chapter 6 used experimental auctions (with a more realistic setting) to elicit consumer WTP for rice under different information referring to sustainable production practices and traceability.

It makes sense to compare between rice produced with IPM (from the choice experiment, Chapter 5) with rice that has a VietGAP label and supplementary information on the certification (i.e. treatment T2, Chapter 6). This is because rice produced under IPM and VietGAP rice have some similar quality aspects such as safety and environmentally friendly (although the GAP standard may cover broader aspects than IPM, Figure 1.1., Chapter 1). The premium for rice produced with IPM is about 45% (Chapter 5), while the premium for VietGAP rice is about 24% (treatment T2, Chapter 6). This shows that the premium for rice produced

with IPM is higher than the premium for VietGAP rice (i.e. rice with VietGAP label and information on the certification). However, we have to take into account that WTP for rice produced with IPM is estimated with a choice experiment, which is a stated preference method. Although we tried to account for the limitations of this method by using cheap talk to remind consumers about their budget constraints and used choice sets that were as realistic as possible, the nature of choice experiment is still a stated preference method, hence may suffer, to some extent, from hypothetical bias, i.e. consumers state their WTP but they do not have to pay for their choice. In the experimental auctions, a more realistic setting is applied and consumers have to pay for their choice following the rules of the auction mechanism. Thus, in the experimental auctions, consumers may have to think more carefully before providing their WTP. This might explain why the WTP premiums in the choice experiment are higher (in this case almost double) compared to experimental auctions.

Some comparisons between the premiums for quality rice attributes and their market prices are realistic too. In terms of organic rice, the study found that consumers were willing to pay more than 80% extra for organic rice (Chapter 5). This premium for organic rice in this study is still lower than the premium for several types of organic rice in the market, which may help explaining why the market share of organic rice remains small. It is observed that the price of many types of organic rice in the market are substantially higher (e.g. rice with EU and USDA organic standards). This may be due to the costs associated with the production and accreditation of organic food are currently relatively high.

In terms of rice with health benefits, the study found that consumers were willing to pay more than 90% premium for rice with claimed health benefits. Similarly to the observation for the premium of organic rice, it is also observed that many types of rice with claimed health benefits on the market have higher premium compared to the premium that we found for rice with claimed health benefits in this study. In Chapter 6, it is observed that the premium for VietGAP rice without supplementary information (treatment T1) is also still lower than many types of rice with certified labels in the market. It should be noted that the variation in the premium depends on the certification schemes (GlobalG.A.P or VietGAP) as mentioned in the introduction of the thesis, and also depends on the brands.

In Chapter 3, the self-reported price of rice purchased by the study participants was, on average, about VND15,000/kg. It should be noted that this price included all types of rice (both various



types of conventional rice and rice with quality labels). This self-reported average price was about 15% higher compared to the price of conventional rice<sup>37</sup>.

#### *7.1.1.6 Socio-economic characteristics' influence on consumers' attitudes and behaviour towards quality food*

There was relatively little evidence of socio-economic characteristics on consumers' food choices. The study showed that consumers who have a higher income and better education levels tend to be more familiar with food quality certifications. Results of the experimental auctions study indicated that there is an income effect on the WTP for sustainably-produced rice. Similarly, the study found that income has a positive effect on consumer purchase behaviour towards quality-certified rice. Therefore, the urban upper-middle income segment is a promising target market for quality-certified rice.

#### *7.1.2 Limitations of the study*

##### *7.1.2.1 Limitations associated with sampling*

The study uses cross-sectional data. The non-probability sampling methods were applied in the data collection in 2015 and 2016. A common advantage of non-probability sampling methods over probability sampling methods is relatively lower costs (Bornstein et al., 2013). However, the non-probability sampling methods may have disadvantages such as selection bias and limitation in terms of its generalisability (Bornstein et al., 2013; Mullinix et al., 2015). In our study, the use of non-probability sampling methods within the study areas limits generalisation of the results to the overall population. Also, interpretations of the results are limited to the sampling frame of the study. In addition, the data from a consumer survey in 2016 were from a rather small samples of respondents in an urban area in Vietnam. Because of the lack of a full list of the population, the study applied non-probability quota sampling with quota control characteristics to ensure that the composition of the sample matched the distribution of the population. Results should be interpreted with respect to the sampling frame for the study. Although it is admitted that probability sampling methods may require substantial efforts and are usually prohibitively expensive (Bornstein et al., 2013). However, if more resources are available, it is suggested to consider the use of probability sampling methods in future research

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<sup>37</sup> 1 kg of conventional rice was, on average, priced at VND13000 in the study areas (this is the average price of conventional rice of both Ho Chi Minh city and Can Tho city) in 2015.

to increase the representativeness and generalisability, for example. In the case there is limited resources, the use of quota sampling is suggested (Bornstein et al., 2013).

In the data collection in 2015 and 2016, the samples were dominated by more females than males. Although gender equality was taken into account during the sampling, females are typically the main food shoppers for households in Vietnam, similarly as in many other places in Asia such as Taiwan (Yeh et al., 2017) and China (Maruyama & Wu, 2014). As indicated in the introduction of the thesis, some studies found that women tend to pay smaller price premiums for quality rice than men (Demont et al., 2017; Depositario et al., 2009). Thus, future research should try to account for this limitation in terms of reducing gender imbalance in the sample.

The study focuses on consumers attitude and behaviour towards food with quality labels for rice and vegetables. As most food with quality labels are sold in supermarkets and supermarket is an important source of information that consumers use and trust when purchasing food (Chapter 2), therefore the second study (in 2016) targeted supermarket shoppers who tend to have a little higher education than the population on average. Also, in order to provide more targeted implications while taking into account the requirements of product evaluation and real payment of the auction mechanism, and the target population of quality-certified rice, the survey with auction (in 2016) targeted participants from 23 years on. Therefore, as indicated in the discussion of Chapter 4 and Chapter 6, the results should be directed to supermarket shoppers and within our sampling frame which we acknowledge. In addition, the study sample is limited to consumers who live in two major cities in the South of Vietnam which limits generalisation of the results to the overall Vietnamese population. It is suggested to conduct the study in other places and with a larger sample size for more validation of the results.

The cross-sectional data were obtained from different samples of respondents. Previous study has shown that a more valuable approach for consumer study is to obtain the data from the same sample of respondents (Verbeke, 1999).

#### *7.1.2.2 Limitations associated with self-reported measures*

The self-reported measures may have some advantages such as low cost, ease of use, flexibility (Kormos & Gifford, 2014) which justify their common use in social sciences. However, according to Kormos and Gifford (2014), self-reported measures also have disadvantages such as: (i) social desirability bias which leads to under- or over-report behaviour; (ii) self-reported measures are subjective, for example, descriptive words such as “often” may not be perceived

as similar meaning from one to another person; (iii) the memory capacity and knowledge may affect the accuracy of self-reported measures.

In our study, the questionnaires completed by the participants were self-reported. This may suffer, to some extent, from social desirability, post-rationalisation, or cognitive dissonance or consonance and thus may deviate from actual behaviour (Verbeke, 1999). To account for the limitations associated with self-reported measures, before each data collection, we did the pilot tests carefully to verify the clarity of the questions and terms used in the questionnaires, and to make sure that consumers understood the questions properly. Based on the pilot tests, the questionnaires were improved and finalised. We also specified all scale points with specific words for the questions in the questionnaires (where applicable) as suggested by Krosnick and Berent (1993). Also consumers were guaranteed that their answers are processed with confidentiality and anonymity, in line with the suggestions of Krosnick and Berent (1993) and Hofenk et al. (2017).

In order to increase the effectiveness and credibility of self-reported measures, improvements can be made in terms of the question format, wording and context (Kormos & Gifford, 2014). For example, it is encouraged to use questions that are easy for consumers to recall their memory or do not use the questions that may cause difficulties in memory recall. It is suggested to conduct pilot tests for the questionnaire carefully to make sure that questions are simple, precise, and understandable. This can contribute to improving the clarity of the questionnaire and overcoming certain limitations associated with self-reported measures. In addition, it is suggested that future research should label all scale points with specific words for the questions in the questionnaires (Krosnick & Berent, 1993). Furthermore, as suggested by Krosnick and Berent (1993) and Hofenk et al. (2017), self-reported data should be collected anonymously in order to account for its limitations. Finally, to account for the limitations associated with self-reported measures, it is recommended that future studies should employ more experimental and observational approaches, or revealed preference approaches.

### *7.1.2.3 Limitations associated with hypothetical bias*

The choice experiment is a useful method to investigate consumers' WTP for food quality attributes and to observe the trade-off between the attributes (Gao & Schroeder, 2009). However, the choice experiment is often based on the stated preference method. In this method, consumers were faced with hypothetical choices and were asked to state their WTP, but they did not have to pay for their choices. Thus, participants may behave differently in a hypothetical

buying situation than they would in a real purchase situation. This refers to hypothetical bias in choice experiment (Hensher, 2010). Nevertheless, the choice experiment applied an efficient design to reduce potential hypothetical bias and used choice sets that were as realistic as possible (Bliemer et al., 2008). Also, the study employed cheap talk to reduce bias associated with hypothetical settings and to remind consumers about their budget constraints (Silva et al., 2011). Despite the limitations, WTP estimations via a choice experiment can give researchers and policymakers an idea about consumers' preferences for different food quality attributes and contribute to resources allocation decisions of policymakers and enterprises (Mangham et al., 2009). Further research is recommended using non-hypothetical settings and incentive-compatible methods such as experimental or observational studies, or revealed preference methods, to account for these limitations. In the case future research would like to apply choice experiment, it is suggested to design the choice sets as realistic as possible which can contribute to providing more practical implications. Also, the use of cheap talk is encouraged to make participants carefully consider their budget constraint before answering the choice questions. These can contribute to significantly reducing the hypothetical bias associated with the stated preference method.

#### *7.1.2.4 Limitations associated with feedback loops in the conceptual framework and factors influencing consumer decision making*

##### *Limitations associated with feedback loops in the conceptual framework*

In this thesis we only examine the associations between the variables but we do not test the causality. However, we acknowledge that feedback loops may be presented in the conceptual framework. There were criticism in terms of the order of hierarchy of effects (based on Barry & Howard, 1990), for example, a cognition-conation-affect sequence (Krugman (1966)), an affect-conation-cognition sequence (Zajonc (1986); Zajonc and Markus (1982)); a conation-affect-cognition sequence (Bem (1972); Kelley (1973); Ray et al. (1973)); an affect-cognition-conation sequence (Zajonc (1980)).

Krugman (1966) suggested a cognition-conation-affect sequence. According to Krugman (1966), there are consumers who are aware about the product via advertising, however, the advertising messages do not necessarily affect the attitudes and motivations of these consumers. Nevertheless, due to the exposure times to the advertising messages (cognition), they just buy the product (conation), and have the positive or negative feelings towards the products (affect) after purchasing.

Other authors such as Zajonc (1986) and Zajonc and Markus (1982) suggested an affect-conation-cognition sequence. They argued that consumers preference may be based on their positive or negative feelings and motivations towards the products (affect), which drive their purchase behaviour (conation), and this would further strengthen their awareness, knowledge, thoughts, beliefs towards the products (cognition). In addition, Zajonc (1980) also suggested an affect-cognition-conation sequence.

Other authors such as Bem (1972), Kelley (1973), Ray et al. (1973) suggested a conation-affect-cognition sequence. According to these authors, consumers first purchase the product (conation), their feelings come after (affect), and their awareness, knowledge, thoughts, beliefs towards the products (cognition) are developed to support the behaviour.

Since our study did not test the causality, it is suggested that the causality relationships between the factors in three components including cognitive, affective and conative and behavioural factors should be tested in future research using experimental approaches. It should be noted that the choice of an approach may depend on how the concepts are defined, the theoretical models applied, assumptions, measurements, context, and the practical level of an approach (Barry & Howard, 1990).

*Limitations related to the theory, factors influencing consumer decision making (targeted determinants)*

According to Kotler et al. (2013), there are four components related to consumers characteristics (personal related factors) that may affect their decision-making process. These components are personal factors (demographics, lifestyle, personality), psychological factors (knowledge, perceptions, motivations, involvement, attitudes), cultural factors (social class, reference group) and social factors (family and reference groups). This thesis, within its conceptual framework, focuses on perceived importance of product attributes, consumers perceptions on different aspects of food with quality labels, motives, attitudes and behaviour towards food choices. In the thesis we did not include the social factors and cultural factors in the models and analyses. These factors may influence consumers decision-making towards food with quality labels. It is suggested that future studies can further examine the effects of other factors such as cultural factors and social factors on consumer decision-making towards food with quality labels.

### *7.1.3 Implications*

This study provides implications for various actors at different levels in the food supply chain for rice (and for vegetables for certain aspects). These levels include producers (including farmers), marketers and retailers, food and agricultural organisations and institutions, policymakers and the government, mass media and further research.

#### *7.1.3.1 At the producers' (including farmers') level*

Results from Chapter 3 showed that consumers who have higher perceived importance of environmentally friendly behaviour relating to the purchase of quality rice tend to have more positive attitudes towards quality-certified rice. In addition, consumers are willing to pay more for sustainably-produced rice (Chapter 5, Chapter 6). Thus, it is suggested that producers should adopt more sustainable rice farming practices in order to provide rice that is of better quality and is guaranteed with sustainable production standards (such as GAP-certified rice, IPM rice, organic rice). This will contribute towards improving the economic value of their products. The premiums for sustainable food (e.g. organic food) can contribute to increasing the profit for farmers (Kuminoff & Wossink, 2010). However, results from Chapter 5 showed that the price premium for organic rice in this study is still somewhat lower than the current price of several types of organic rice in the domestic market. Also, in Chapter 6, the price premium recorded for the VietGAP label (without information) is somewhat lower than some certified rice in the market. Hence, it is important to improve consumers' awareness and knowledge of the costs and benefits associated with sustainable production methods (such as organic, GAP) to increase their appreciation of rice produced under these quality standards. The discussion on how to improve consumers' awareness and knowledge of sustainable production methods and their perceived self-competence in identifying certified rice has been described in detail in the discussion of Chapter 4. Depending on the resources of the companies, different communication tools can be applied to reach their target consumers. In addition producers will also need a great deal of support from the government in the communication strategy towards improving consumers' knowledge and perceived-self competence. This was discussed in detail in the discussion of Chapter 4.

Furthermore, in their pricing decisions, rice producers should attempt to find a balance between the cost of production (e.g. the costs to follow sustainable production methods such as organic, GAP) and consumer affordability. The implications to overcome the issue of high production

costs of sustainably-produced food are discussed in detail in the end of this section (as it involves in several solutions and different stakeholders).

Results from Chapter 3 showed that consumers who show greater concern about the safety aspects of rice have more positive attitudes towards quality rice. In addition, trust in the food quality certification system is an important factor that affects consumers' purchase of quality-certified rice (Chapter 4, Chapter 6). Therefore, rice producers should attempt to obtain credible quality assurances for their products to increase the positive attitudes of consumers towards quality-certified rice, as well as enhancing consumers' trust in the food quality certification system. Also, it is reported that the application of food safety certification can significantly contribute to increasing the transaction efficiency in the food supply chain and reducing the number of supplier audits (Global Food Safety Resource (GFSR), 2016; Kotsanopoulos & Arvanitoyannis, 2017). In addition, it is suggested that rice producers should properly include information about quality assurances and traceability on food labels. Wu et al. (2015) indicated that Chinese consumers were willing to pay extra for quality assurance and traceability information, however, their knowledge towards these types of information is still limited. Similar situation is observed in Vietnam. Hence, further actions to improve consumers' knowledge on quality assurance and traceability system are encouraged. These efforts will consequently contribute to increasing consumers' appreciation and WTP for quality-certified rice.

Results from Chapter 5 showed that there is a market opportunity for rice with claimed health benefits as consumers are willing to pay extra for rice that has this characteristic. Thus, it is recommended that rice producers should further collaborate with the agricultural institutions to develop rice that contains health benefits. As mentioned in the discussion of Chapter 5, there are many approaches to improve health benefits of rice (e.g. via fortification, or biofortification (agronomic practices, conventional plant breeding, genetic engineering)). However, it is important to notice that there should be a perceived compatibility between the techniques for improvement of health benefits and the production methods. For example, the use of fortification for organic rice has to follow specific organic production regulations in western countries (International Federation of Organic Agriculture Movements (IFOAM), 2012), and the use of genetic engineering for organic products is not allowed (IFOAM, 2005). In conventional or IPM rice, regulations are less strict in terms of enhancement of health benefits. Although the Vietnamese government does not yet have specific rules and regulations for the fortification of organic food, the compatibility between the techniques and the production

methods should be taken into account in the long term strategy development. Alternative ways for the combination of organic and health attributes can be further developed, for example, applying organic production method for natural rice varieties containing good nutrients such as healthy vitamins, minerals, and fibre. Results from Chapter 5 also showed that consumers were willing to pay for rice that guarantees a fair price to farmers. It was reported that some fair trade products (chocolate, tea, coffee, cotton and wine) have been sold in emerging markets such as South Africa (2009), Brazil (2011), Kenya (2013) and India (2014) although these products still occupy a market niche in these countries (Pickles et al., 2016). As fair trade is a new and emerging trend in developing countries, and consumers were willing to pay for rice that has this attribute, rice producers are also encouraged to invest in rice that guarantees a fair price to farmers.

Another implication is that rice producers should collaborate with agricultural institutions to adapt their products according to consumer preferences. Results from Chapter 4 showed that beliefs in the sensory aspects and convenience aspects of certified rice significantly affect their purchase behaviour. Therefore, the taste of rice and convenience characteristics (i.e. availability, cooking characteristics) should be further developed in line with the preferences of target markets, such as urban consumers in the upper-middle income class. Also, the taste of rice should be adapted to consumers' preferences in different regions. During the survey, consumers shared the idea that it is highly appreciated that the rice is sustainably and safely produced. However, it is also important that sustainably-produced rice should have a good taste. Thus, it is important to improve the sensory aspects of quality-certified rice as part of the development strategy for quality rice.

With increasing income and rapid urbanisation, there may be a shift in consumer consumption patterns. The consumption of staple food such as rice may decrease, while the amount of other foods consumed, such as meat, seafood, dairy products, fruit and vegetables, may increase (Kearney, 2010). In this context, consumers may demand a lower quantity of rice with their meal, but higher quality. Hence, they may be willing to pay more for rice that has quality characteristics. From the producers' perspective, this is an opportunity to gain greater benefits by providing quality rice that meets consumers' preferences and at affordable prices to the target market. Thus, rice producers should note this trend and increase investment in the quality aspects of rice.

Results from Chapter 3 showed that consumers who have higher perceived importance of environmentally friendly behaviour relating to the purchase of safe vegetables, and those who



showed more concern about the safety aspects of vegetables have more positive attitudes towards safe vegetables. Therefore, vegetables producers are encouraged to adopt safe and sustainable production practices for vegetables.

*Implications to overcome the issue of high production costs associated with sustainably-produced food*

Currently, in addition to the high cost of adoption of sustainable agricultural practices (e.g. organic, GAP), the costs of segregation (traceability) and certification are also relatively high. Therefore, some suggestions are provided to overcome the high production costs associated with sustainable production. Small producers (farmers) are encouraged to join the groups (such as cooperatives, companies, firms) as these groups have more resources to adopt sustainable production methods than individual resources. In addition, it is suggested that the companies, firms should have good policies in connecting and sharing the benefits and profits with the primary producers (farmers) which can contribute to motivating the primary producers in participating in good agricultural practices.

In order to obtain products at affordable prices, it is recommended that the producers (cooperative, firms, companies) should play a central role, while other stakeholders (government, policymakers, academia, domestic and international institutions/organisations, etc.) play supporting roles. During the adoption of sustainable production methods, there will be many challenges including those that can be solved by the producers and those that need supports. The producers are encouraged to develop their own initiatives to solve the challenges (in both production and market the product) themselves where possible and share their experiences and initiatives with other producers to support each other. For the challenges that cannot be solved by the producers, these will need the supports from the stakeholders (government, policymakers, academia, domestic and international institutions/organisations, etc.). These challenges can be share at the meetings with the stakeholders (national and local government, producers, business, academia, non-governmental organisations, consumers organisation representative). The government should collaborate with other stakeholders to organise these meetings in order to identify the key challenges and find solutions for these challenges. There are some key challenges relating to the land use policy, financial resources, skills and technology, high accreditation cost, finding market for the products, and communication of sustainable production practices to consumers.

In terms of the land use policy, in order to significantly reduce the production cost, producers will need to transfer to a larger scale of production. The FAO (2018) suggested that the application of technology and economies of scale (e.g. increasing scale of production) can contribute to reducing the costs of organic production. Therefore, the policymakers are encouraged to develop more supporting policies and mechanisms in terms of improving access to a larger scale of land use for sustainable production practices.

In terms of financial challenges, the adoption of sustainable production practices usually requires substantial financial investment. Therefore, the government should collaborate with the domestic and international organisations (in the financial field) to have the policy that can support producers in terms of providing loan for their business. There is some emerging efforts in providing loan for good agricultural practices business in some provinces in Vietnam. However, these are still limited and should be further encouraged.

In terms of challenges related to lack of skills and technology, this will need the supports from the agricultural institutions, academia, domestic and international agricultural organisations. The supports from these organisations are illustrated in detail in the section 7.1.3.3, implications for food and agricultural organisations and institutional levels. In terms of the challenges related to high accreditation costs, this is discussed in detail in section 7.1.3.4, implications for the policymakers' and government level.

In terms of challenges related to finding the market for the sustainably-produced food, this will need a lot of collaboration between producers and the stakeholders. Depending on the target markets (domestic and export markets) and the policies of the export markets, there are different strategies to reach these markets. Also, depending on the resources and competences of the producers, they can choose their target markets. In terms of domestic market, producers should connect with the retailers, distributors to explore consumers preferences and demand for the products. This can contribute to providing more insights into the product strategy of the company. In terms of export markets, depending on the policies of the export markets, some markets such as the EU countries have some priority policies (e.g. tariff elimination) for Vietnam's rice exports to the EU (EUROPA, 2016). This has been discussed in detail in the discussion of Chapter 6 of the thesis. In addition, companies should take into account the fact that the export markets may have higher requirements in terms of production standards. In addition, collaboration with big firms to connect farmers' outputs with the markets is a further important step that can help farmers to find the right market for their products. Contract farming is a typical example that is currently being conducted in several places in Vietnam which should

be further developed to prove its effectiveness in increasing the value of quality rice for the primary producers.

In terms of the challenges related to communication of sustainable production methods to consumers, this idea has been discussed in the discussion of Chapter 4.

#### *7.1.3.2 At the marketers' and retailers' level*

Results from Chapter 3 showed that consumers' perceived importance of environmentally friendly behaviour relating to the purchase of high quality rice, food safety concern were positively associated with consumers' attitudes towards high quality rice as well as towards safe vegetables. Hence, the marketing strategy must incorporate the sustainability aspect, or environmentally friendly aspect, of quality-certified rice, as well as quality-certified vegetables, in their communication messages to consumers to increase positive attitudes towards quality rice and safe vegetables. In addition, communication should focus on the safety aspects of quality-certified rice and quality-certified vegetables.

Results showed that consumers' belief in the health benefits of certified rice positively influences their WTP (Chapter 6) and purchase behaviour (Chapter 4) towards quality-certified rice. Thus, marketers are encouraged to demonstrate the health benefits of certified rice and enhance consumers' belief in the health benefits of certified rice. In the case the rice contains certain health benefits, producers and marketers can apply for official certificates of certain health benefits (via quality assurance and testing centres). These certificates should be used in the communication to consumers to demonstrate the health benefits of certified rice and to enhance consumers' belief in the health benefits of certified rice.

Results showed that consumer's belief in the value for money of certified rice compared to conventional rice positively influences their WTP (Chapter 6) and purchase behaviour (Chapter 4) towards quality-certified rice. Therefore, marketers should make more efforts to demonstrate that certified rice is good value for money in comparison to conventional rice. In order to do this, marketers should invest considerable effort in increasing consumers' knowledge of, and familiarity with, food quality certifications, improving consumers' understanding of the costs and benefits associated with sustainable production methods (e.g. GAP, organic, IPM), as well as enhancing their self-competence in identifying quality-certified rice from conventional rice. Consumers who are more familiar with food quality certifications and have greater knowledge of sustainable production methods are expected to have a higher appreciation for rice produced with sustainable production methods, and consequently provide a higher WTP for quality-

certified rice. Further discussion on how to improve consumers' knowledge of food quality certification and their self-competence in identifying certified rice has been illustrated in detail in the discussion of Chapter 4 of the thesis.

It is important to make decisions in terms of the way and amount of information related to sustainable production and quality assurances (e.g. the meaning of certification itself, and certification parties) that should be communicated to consumers. It was reported that consumers may find it difficult to understand what the certification is about, which organisations and parties are involved in providing quality assurances (Eden et al., 2008). Depending on the context of communication, targeted and selective communication should be made, in order to avoid confusing and increasing the effectiveness of the communication. It is important to support consumers to identify which aspects are guaranteed by a specific quality assurance<sup>38</sup>. From the results of the thesis and as food safety is a major concern in Vietnam (Chau et al., 2014; Ha et al., 2008; Hung et al., 2017; Le et al., 2017; VFA, 2000-2012; World Bank, 2016a), for instance, marketers can provide a short and to-the-point message about the main aspects (e.g. safety, environmentally friendly, welfare) that the quality assurance (applying on their product) covers, while putting more emphasis on safety-related aspects. Also, sustainable food production and consumption is an emerging trend in the developing countries including Vietnam (De Koning et al., 2015; Thong et al., 2017). Hence, if the quality assurance (that the company applies) also covers the aspect of environmentally friendly or welfare, relevant communication about these aspects should also be made. The credibility of the certification party involving in the certification process should also be mentioned. For example, at the moment, some companies in Vietnam show the official certifications that are certified by well-known accreditation agencies in the world on their official websites, however, consumers do not necessarily know about these accreditation agencies. Thus, a short communication about how credible the accreditation agencies are should also be included in the message to consumers.

At certain intervals, the marketers for the rice industry and retailers should conduct consumers surveys to obtain feedback from consumers about their satisfaction with rice products, as well as complaints, in order to improve the products in line with consumers' preferences. Investment in concretising information on the rice product label is extremely important, as information provided on the rice labels should effectively support consumers in making their purchase

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<sup>38</sup> This is because there are different types of quality assurances as mentioned in Chapter 1 of the thesis. Each type of quality assurance covers certain aspects (e.g. safety, environmentally friendly, welfare, etc.)

decision. Results from Chapter 4 showed that consumers' beliefs in the sensory aspects, convenience aspects, health benefits of certified rice significantly affect their purchase behaviour. In addition, results from Chapter 6 showed that consumers were willing to pay more for rice that has information referring to sustainable production practices and traceability. Therefore, information on the food labels, such as sensory characteristics, cooking guidelines, traceability characteristics, sustainable and safe production methods, health benefits should be mentioned in meaningful, selective, relevant, trustworthy communication. It is reported that traceability (via improving the transparency across food chain) can contribute to improving consumer confidence in the food system, specifically when it is used in the context with other quality assurances (Menozzi et al., 2015). A meaningful food label should contain relevant and selective information to be communicated to consumers in order not to confuse and overload consumers with too much or irrelevant information. Labelling can be used as a tool to promote sustainable food production, importantly, information provided on the food label should be "simple, to-the-point and trustworthy" (Rousseau & Vranken, 2013, p.42).

Results from Chapter 2 showed that consumers' perceived intrinsic attributes (including perceived trustworthiness in the product itself) were positively associated with their purchase intention towards food with quality labels. In addition, results showed that consumers' trust in the food quality certification system has a positive effect on their WTP (Chapter 6) and purchase behaviour (Chapter 4) towards quality-certified rice. Thus, from the producers' and marketers' perspective, when they apply for the sustainable production practices (e.g. GAP, organic), they should properly follow the rules and regulations of these production practices in order to ensure the quality of products that are produced under these standards. Producers and marketers are encouraged to communicate their production practice procedure (for example, via media, farm visit tours, or fairs to demonstrate the environmentally friendly and safety aspects of the production practices) to consumers to enhance their trust in products carrying the quality standards and trust in the food quality certification system. Once a unified logo, such as VietGAP, can be established, producers and marketers should also collaborate with government agencies and retailers to communicate the meaning of the quality signal (such as a logo) to consumers to increase their awareness and knowledge about the meaning of the quality signal. The combination of public and private communication can significantly contribute to improving consumers' awareness and knowledge of food quality certifications.

All these activities can effectively support consumers in identifying quality products in the market, reducing search and information costs to consumers, and enhancing consumers' trust

in the products and in the food quality labelling system. The use of info-graphic communication is a promising approach that can be employed to provide information on the food label, as this is an effective and easy way for consumers to grasp the ideas from the products and to easily remember the information on the food label.

#### *7.1.3.3 At the food and agricultural organisations and institutions level*

Food and agricultural organisations, and related institutions, play a very important role in assisting producers (including farmers) with important and valuable resources to adopt a sustainable production system for food (including rice and vegetables) in Vietnam. This is because producers themselves, in most cases, do not have sufficient resources (such as human, financial, technology) to properly adopt sustainable production practices. Thus, in the beginning phases of adoption of sustainable production practices, producers will need a great deal of support from agricultural organisations and institutions. Support can be provided in terms of supporting input use, such as seeds, or providing practical knowledge through the organisation of training sessions and provision of consultation services on skills for sustainable production practices.

Results from Chapter 4 showed that consumers' beliefs in the sensory aspects, convenience aspects, health benefits of certified rice significantly affect their purchase behaviour. In addition, results from Chapter 6 showed that consumers were willing to pay more for rice that is produced under sustainable production practices. Hence, it is important to support producers with rice seed that is of good quality, has certain health benefits, is suitable for the principles of good agricultural practices, is more resistant to climate and other conditions, and also has good sensory aspects. In order to provide such support to producers (including farmers), it requires significant effort and assistance from the agricultural organisations and institutions, as these actors have huge human resources as well as advanced technologies and a good research environment to explore various types of rice with quality traits.

In addition to assisting food producers (such as rice and vegetable producers), food and agricultural organisations also play an important role in supporting the developing and emerging countries, such as Vietnam, to assess the market for agricultural products to provide more insights for value chain actors and policymakers in terms of developing a long term strategy for building a food quality labelling system for the country. In order to build a sustainable food production strategy for the country, it is important to mention the vital roles of food and agricultural organisations, such as Sustainable Rice Platform (SRP) & International

Rice Research Institute (IRRI), FAO, CGIAR and other international agricultural organisations and institutions, who represent and play crucial roles in promoting sustainable food production in the region and globally. It is recommended that these organisations should further assist and provide valuable support in the development strategy for sustainable food production in Vietnam. Importantly, as the SRP plays a crucial role in promoting sustainability in the global rice sector, it is suggested that the SRP should further collaborate with Vietnamese policymakers to effectively support rice value chain actors (e.g. farmers, producers, enterprises) who are working in the rice sectors to promote sustainable rice production and consumption in Vietnam.

#### *7.1.3.4 At the policymakers' and government level*

It is important to create favourable conditions and support rice and vegetable producers (including farmers) to adopt more sustainable farming practices. Results from Chapter 5 showed that consumers were willing to pay more for rice that are produced under sustainable production methods (organic, IPM). As mentioned in Chapter 1 of the thesis, since the guidelines for organic production in Vietnam are very basic and still cannot be fully applied in the reality (based on the guidelines of 10TCN 602-2006, MARD, 2006; and TCVN 11041:2015, MOST, 2015). It is recommended to develop a detailed set of criteria and guideline for the organic production for specific product categories (such as detailed guidelines for the organic production of rice, detailed guidelines for organic production of vegetables and fruit) and the official national organic standard of Vietnam. This can be used as supported materials for the producers, the certification and accreditation agencies to follow the organic production standard of the country for the specific product categories. In addition, results from Chapter 6 indicated that consumers were willing to pay more for rice that has the information referring to sustainable production practices. Therefore, policymakers should attempt to formulate better mechanisms to support rice (and vegetable) producers to obtain quality standards at affordable costs since the accreditation costs to obtain quality assurance such as VietGAP is currently relatively high and requires substantial time and effort. This can significantly contribute to increasing farmers' and rice and vegetable producers' motivation to adopt sustainable production practices. In addition, policymakers should also create greater opportunities for the food and agricultural organisations, firms and companies to have more connections with farmers so that they can collaborate and support each other in producing quality rice and safe vegetables.

Results showed that trust in the food quality certification system is an important factor that influences consumer WTP (Chapter 6) and purchase behaviour (Chapter 4) towards quality-certified rice. Hence, it is important to establish, manage and control food quality standards including those for rice and vegetables in the market. According to Hobbs et al. (2002), the development of an effective and credible food safety regulatory system is a crucial task of the public policy. It is important that this food safety regulatory system should ensure food safety standards for consumers, while considering the appropriate standards (that satisfy food safety requirements and are not too hard to adopt) as this may influence the competitiveness of the producers and the food industry (Hobbs et al., 2002). Policymakers must have effective mechanisms, such as clearly defined responsibilities for different ministries and institutions for food safety control to avoid overlapping functions across different government institutions.

As mentioned earlier, it is extremely important to build a credible logo that represents the quality aspects of sustainably-produced food. The discussion towards issuing this logo has been provided in detail in the discussion of Chapter 2 of the thesis. Government should demonstrate their central role in the process of developing these quality signals (logos), while producers, marketers, other related organisations, and consumers can collaborate in this venture to share and provide useful ideas for developing quality signals for sustainably-produced foods. Notably, it is crucial to build effective regulatory mechanisms to control and monitor the compliance of producers with these production standards (i.e. whether producers fully comply with the requirements of good agricultural practices) in order to increase the credibility of the products themselves and consumers' trust in the food quality certification system and in the products carrying these quality signals (logos).

Results from Chapter 6 showed that consumers were willing to pay more for rice that has information referring to sustainable production practices and traceability. Therefore, for the long term development of the food quality system, policymakers should attempt to establish and develop a traceability system for food, including rice and vegetables. This would significantly contribute to increasing information transparency about the products (rice, vegetables) to domestic consumers as well as increasing the value of food exports (rice, vegetables) via a clear indication of origin.

A very important issue is that the government should have an effective mechanism to control and regulate the credibility of information provided on the food labels, in supermarkets, in the media and through other channels. The government should also have an effective mechanism to regulate the mass media (also social media) in terms of providing reliable and accurate



information about food safety issues to consumers. According to the Decision 629/QĐ-BNN-QLCL of the MARD issued in 2016, the government related agents (Agricultural and rural development agents at the national and local levels) are responsible for collaboration with political and social organisations and the media to perform certain tasks. These include: (i) communicating about the effects of harmful inputs use in the production on consumers' health as well as producers' damage (if they use the harmful inputs in their production); (ii) informing food safety information in time to consumers during food incidents; (iii) supporting and introducing the producers, companies, retailers that have official quality assurances to consumers (MARD, 2016, Decision 629/QĐ-BNN-QLCL).

#### *7.1.3.5 At the mass media level*

The mass media (such as TV, advertising) plays a very important role in providing information about food safety and quality issues to consumers. Results from Chapter 2 showed that consumers' perceived intrinsic attributes (including perceived trustworthiness in the product itself) were positively associated with their purchase intention towards food with quality labels. Also, results showed that consumers' trust in the food quality certification system positively influences their WTP (Chapter 6) and purchase behaviour (Chapter 4) towards quality-certified rice. Therefore, the mass media must provide credible, reliable and accurate information about food safety. This is because consumers deserve to have trustworthy and reliable information about the food they consume. Possible losses for the food industry due to inaccurate information should be avoided. This could be a loss for the food industry (producers, firms, companies) due to incorrect information about products provided by the mass media. In addition, inaccurate information may increase search and information costs to consumers.

It is indicated that the media play an extremely important role in providing information about food safety especially during food incidents (Wilson et al., 2014). Thus, collaboration between the media with related institutions that have official and credible information sources about food safety issues is important to guarantee the credibility of information provided to consumers (as mentioned above, MARD, 2016, Decision 629/QĐ-BNN-QLCL). It is suggested that during the food incidents, the public health professionals should collaborate with the media to provide reliable and accurate information about food safety to consumers (Wilson et al., 2014). In this way, the media can effectively support consumers' food choices with reliable information. The media also plays an important role in supporting producers and companies to demonstrate the quality aspects of their products. Results from Chapter 2 showed that, when purchasing food,

consumers tend to use information from supermarkets and TV. Thus, information provided through these communication channels should be well regulated and properly controlled in order to provide trustworthy information about food.

#### *7.1.3.6 The implications for further research*

This study only focused on rice and vegetables. Since the trend towards sustainable food production and consumption is emerging in Vietnam, future studies should therefore explore consumers' attitudes, perceptions and behaviour for other product categories such as dairy products, seafood and meat that are produced under sustainable production standards.

Although the investment in GAP may have more benefit in the long term for both domestic and export of food with quality labels. In addition, as long as the producers get familiar with the production of GAP and make use of the resources, the costs of production can be further reduced with more experience, applying technology, and improving larger scale of production (FAO, 2018). However, it is observed that currently the cost to adopt sustainable production practices such as VietGAP, GlobalG.A.P., and accreditation costs are relatively high. Therefore, a transition from conventional production to some types of production standards (that are higher than conventional, but maybe lower than GAP in terms of costs) may support producers to adapt step by step before moving to higher standards such as VietGAP or GlobalG.A.P. Thus, if the producers and firms cannot afford to invest in GAP immediately, an alternative is to invest in the lower quality standards such as “three reductions, three gains” (3R3G: reduce the use of seed rate or water, synthetic fertilizer, pesticides; and increase the productivity, economic effectiveness per area, product quality) and “one must do, five reductions” (1M5R: use certified seeds; reduce seed rate, fertilizers, pesticides, irrigation, and post-harvest loss) (Demont & Rutsaert, 2017). This is also one of the potential approaches to gain safety and more environmentally friendly production with lower cost than GAP. At the moment, these standards (3R3G, 1M5R) are relatively well known by the producers, however, not yet well known by consumers. Therefore, it is suggested to study the attitudes of consumers towards these standards to understand how consumers evaluate rice produced with these standards.

In addition, there are some suggestions to overcome the limitations in sampling, and limitations associated with self-reported measures and hypothetical bias. These were presented in detail in the section 7.1.2. limitations of the thesis. Future research are suggested to take into account these suggestions to improve the design as well as the methodology of their studies. Depending on the objectives of the future studies, stated preference methods or revealed preference

methods can be applied. The comparison between stated and revealed preference methods in consumer study can contribute to exploring “the sign and size of the bias associated with using hypothetical rather than actual markets” (Rousseau & Vranken, 2013, p.41). In addition, the use of non-hypothetical methods, such as experimental and observational methods, and revealed preference methods to account for hypothetical bias in estimating consumers’ WTP for quality food is recommended.

As mentioned before, there are different components that may influence consumer decision-making process (Kotler et al., 2013). Future research can explore the effects of cultural and social factors on consumers’ attitudes and behaviour towards quality food. It is also recommended to test the role and effect of certification parties (public, private, independent certified organisations) on consumers WTP for food with quality attributes. In addition, in this study, we did not test the effect of brands together with quality assurance. Thus, it is suggested that future research can include and test the effects of brands and quality assurances on the WTP for food with quality labels. Also, future research can investigate different aspects of information effects such as the benefits (positive) and costs (negative), and both benefits and costs (both positive and negative) of quality assurances and traceability system on the WTP.

In addition, as mentioned in the introduction of the thesis, at the moment, the demand for food with quality labels is in an emerging stage in the urban areas. Future research can explore the demand for food with quality labels in rural areas when demand for food with quality labels develops further and extends to these areas.

## **7.2 Conclusions**

The main findings from the thesis are presented. With increasing income and rapid urbanisation, Vietnamese consumers have shown an increased demand for quality food products (Wang et al., 2014). While this trend offers promising market opportunities for food with quality labels, there are challenges related to food safety and quality control in Vietnam. In response to the increasing demand for quality foods, various types of food quality labels have appeared on the domestic market. However, there is an uncontrollable growth and insufficient management of food labels and claims in the Vietnamese food market. In this context, there is a need to develop a quality labelling and monitoring system for quality food products. Therefore, this thesis aimed to investigate consumers’ attitudes and behaviour towards food with quality labels in the Vietnamese food market. The results of the study provide insights into the strategy for building a quality labelling and monitoring system for quality foods (rice and vegetables) in Vietnam.

In order to explore the important aspects (as background information) on which to focus when studying consumers' attitudes and behaviour towards food with quality labels in the context of a developing country, such as Vietnam, Chapter 2 assessed the associations between consumers' perceived importance of food quality attributes and their purchase intentions towards food with quality labels. The study found that consumers' perceived importance of intrinsic attributes (safety, quality, health, trustworthiness) and perceived importance of extrinsic attributes (product labelling and packaging) of food are positively associated with their purchase intentions towards high quality rice and safe vegetables. Thus, it is important to focus on intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) in further research efforts to understand consumers' attitudes and behaviour towards food with quality labels in the Vietnamese food market.

In Chapter 3, the study assessed consumers' awareness of food quality-related terms and showed that Vietnamese consumers' awareness of such terms was relatively low. Chapter 2 showed that extrinsic attributes (product labelling and packaging aspects), are important in consumers' food choices. Hence, in Chapter 3, consumers' familiarity with different food quality certifications (as a labelling aspect) was explored. The study showed that consumers' familiarity with different food quality certifications was relatively low. In addition, those who were familiar with food quality certifications tend to have a higher awareness of food quality-related terms, and more positive attitudes and perceptions towards food with quality labels. Bialkova and van Trijp (2010) indicated that consumers' familiarity with food labels may influence their attention to food labels. Based on these insights, it is recommended that, in order to improve consumers' familiarity with food quality certifications, consumers' knowledge and awareness towards food quality labels should first be significantly improved.

To explore the determinants of consumers' attitudes towards food with quality labels (affective factors), Chapter 3 investigated the associations between consumers' food choice motives and their attitudes towards quality-certified foods. Results showed that perceived importance of environmentally friendly behaviour relating to the purchase of quality rice, perceived importance of rice for healthy eating and food safety concern are positively and directly associated with the general attitude towards high quality rice. In addition, perceived importance of environmentally friendly behaviour relating to the purchase of safe vegetables and food safety concern are positively and directly associated with the general attitude towards safe vegetables. These findings highlight that marketing activities should focus on the safety and environmentally friendly aspects of quality-certified foods in the case of both rice and

vegetables. Additionally, the health aspects of quality rice should also be emphasized in marketing efforts for quality-certified rice.

To further understand consumers' purchase behaviour towards food with quality labels (conative and behavioural factors), Chapter 4 investigated factors that affect consumers' purchase behaviour towards quality-certified rice. Results indicated that consumers' purchase behaviour towards quality-certified rice is affected by several determinants, such as perceived self-competence, trust in the food quality certification system, consumers' beliefs that certified rice has better sensory aspects, health aspects, convenience aspects and value for money compared to conventional rice. In addition, the urban upper-middle income consumer segment is a promising target market for quality-certified rice. The finding also highlights that perceived self-competence in recognising quality products and trust in the food quality certification system are highly important in determining consumers' food choices. Thus, it is recommended to improve consumers' perceived self-competence in identifying quality-certified rice and to enhance consumers' trust in the food quality certification system.

Another important aspect in consumers' attitude and behaviour towards quality rice are consumers' preferences and WTP for different quality rice attributes. In Chapter 5, a choice experiment was used to evaluate consumers' preferences and WTP for different quality rice attributes. Results showed that consumers are willing to pay more for rice that is sustainably-produced (such as rice that is produced with organic or IPM methods), as well as for rice with claimed health benefits, and rice that guarantees a fair price to farmers. This finding emphasizes that rice with credence quality attributes referring to sustainability aspects, health benefits and fair farmer prices present promising opportunities in the context of developing countries such as Vietnam.

As Chapter 2 indicated that extrinsic attributes, such as labelling information, are important in consumers' food choices, in Chapter 6, the thesis further explored consumers' preferences and WTP for rice produced and labelled under a national sustainable production standard and other information cues (supplementary information about the certification and traceability) via experimental auctions. The study showed that consumers were willing to pay more for sustainably-produced rice with increasing levels of information referring to quality labelling (certified sustainable production practices) and other information cues (supplementary information about the certification and traceability). Additionally, consumers who were willing to pay more tend to be more health conscious, more environmentally conscious, trust more in the food quality certification system, have better knowledge of food quality certifications for

rice and believe that certified rice is good value for money compared to conventional rice. This finding emphasizes that communication of the meaning of the quality standards (such as the meaning of the term VietGAP) in a relevant, targeted and proper way is highly encouraged, as this can add greater value to the products. Additionally, information on traceability should be provided to consumers (in sufficient quantity, without overloading consumers with unnecessary information) as this can provide additional value over the inclusion of the food quality certification itself.

Research designs combining different methods, such as surveys, structural equation modelling, choice experiment, and experimental auctions, as used in the present thesis, are highly recommended to explore and investigate consumers' attitudes and behaviour towards food with quality labels in the Vietnamese food market. Combining multiple research and analytical methods has proven to provide complimentary and comprehensive insights.

As indicated in Chapter 6, there is an enormous interest in increasing the sustainability of the national rice sector by the Vietnamese government. However, the sustainable rice production in Vietnam is currently facing substantial challenges. Since the SRP plays a crucial role in promoting sustainability in the global rice sector, it is recommended that the SRP should further collaborate with the policymakers to provide valuable supports for rice value chain actors to improve and promote sustainable rice production and consumption in Vietnam. As the trend towards sustainable food production and consumption is emerging in Vietnam, it is recommended to study other food product categories that are produced under sustainable and good agricultural practices in Vietnam. In addition, it is suggested that experimental methods, observational study approaches, and revealed preference methods should be used to account for eventual hypothetical bias and social desirability bias in consumers' food choices.

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# Appendices

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## Appendix A1.

Table A1.1. Overview of the key food quality schemes in Vietnam

Scheme	Year <sup>1</sup>	Concept	Goal	Aspects cover
<b>GAP scheme</b>				
VietGAP (Vietnamese Good Agricultural Practices)	2008	“VietGAP is the food safety inspection program throughout the food from farm preparation, cultivation and harvesting, post-harvest, storage, including related factors such as environmental, chemicals, plant protection drugs, packaging and even the working conditions and welfare of workers in the farm” (QUACERT, 2016).	VietGAP is a national production standard that aims to improve food quality, safety and sustainable agriculture in Vietnam	Safety (the use of synthetic fertilizer and pesticides is limited, but still can be used according to the rules), quality, environmentally friendly, welfare of the workers
GlobalG.A.P. (Previous name as EurepGAP)	2000	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 (IAF, 2013; QMI-SAI Global, 2018).	GlobalG.A.P scheme aims to provide “safe and sustainable agricultural production to benefit farmers, retailers and consumers throughout the world” (GlobalGAP, 2018)	Safety (the use of synthetic fertilizer and pesticides is limited, but still can be used according to the rules), quality, environmentally friendly, welfare (for the workers, animal)
<b>Organic scheme</b>				
Organic certified by non EU-organic agriculture standard or USDA	2012 <sup>a</sup>	“If used on a product, the EU organic logo <sup>b</sup> indicates that this product is in full conformity with the conditions and regulations for the organic farming sector established by the European Union. For processed products it means that at least 95% of the agricultural ingredients are organic” (EUROPA, 2018).	“The EU requires an equally strict control system with checks carried out at every stage of the organic chain” (EC, 2018) <sup>c</sup> “So whenever you buy organic food, you can be confident that it has been produced in accordance with strict environmental and animal welfare rules and checked accordingly” (EC, 2018).	Safety (the use of synthetic fertilizer and pesticides is prohibited), quality, at least 95% ingredients are organic, non GMO, environmentally friendly, welfare (for the workers, animal)

PGS (Participatory Guarantee System) <sup>d</sup>	2013	“Organic agricultural production is produced under the principles defined in international standards IFOAM (International Federation of Organic Agriculture Movements) [...]. It is the method to cultivate vegetables and fruits, produce food without using any toxic chemicals, such as pesticides, plant protection agents, chemical herbicides as well as chemical fertilizers, Organic production focuses on balancing the natural ecosystem” (PGS VN, 2018a).	This scheme “aims to ensure ecosystem crops, livestock, produce quality products with user safety and provide economic efficiency, maintain and improve soil fertility” (PGS VN, 2018a).	Safety (the use of synthetic fertilizer and pesticides is prohibited), quality, environmentally friendly
<b>Safety related scheme</b>				
HACCP (Hazard Analysis and Critical Control Points)	1990s <sup>e</sup>	HACCP 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 (HACCP, 1994).	This scheme aims to improve the safety of food production.	Safety
GMP (Good Manufacturing Practices) <sup>f</sup>	2009	“Good manufacturing practice means understanding, analysing and controlling the manufacturing process” (Will & Guenther, 2007). “Good manufacturing practice guidelines provide guidance for manufacturing, testing, and quality assurance in order to ensure that a food or drug product is safe for human consumption” (Wikipedia GMP, 2018).	“The objectives of GMP are to control these changes so as to develop the desired qualities in the product, to ensure food safety and to stop or slow down any deterioration in the food” (Will & Guenther, 2007)	Safety
Others hygienic conditions of compliance <sup>g</sup>				

<sup>1</sup> Introduction year to Vietnam

<sup>a</sup> The first organic rice that was certified with EU-organic and USDA standards was in 2012 (Giang, 2015).

<sup>b</sup> “Next to the new EU organic logo, a code number of the control body is displayed as well as the place where the agricultural raw materials composing the product have been farmed. The indication of the place where the agricultural raw materials of which the product is composed have been farmed shall appear as follows: ‘EU Agriculture’, where the agricultural raw material has been farmed in the EU; ‘non-EU Agriculture’, where the agricultural raw material has been farmed in third countries; ‘EU/non-EU Agriculture’, where part of the agricultural raw materials has been farmed in the Union and a part of it has been farmed in a third country” (EUROPA, 2018).

<sup>c</sup> “Organic farmers, processors and traders, must comply with strict EU requirements if they want to use the EU organic logo or label their products as organic” (EC, 2018). “Every operator (farmer, processor, trader, importer or exporter) is checked at least once a year, or more often on the basis of risk assessment” (EC, 2018).

<sup>d</sup>This scheme is known as a community-based certification. This is a program applied mainly in the North Vietnam. PGS was introduced in Vietnam in 2013 (Dam, 2015).

“The Vietnam PGS was developed under the ADDA –VNFU (Agriculture Development Denmark Asia – Vietnam Farmer’s Union) Organic Agriculture Project in 2008 and 2009.” (IFOAM, 2018). “Participatory Guarantee Systems (PGS) had been established as an organic quality system of PGS Vietnam was certificated by IFOAM” (Giang, 2015). “A guarantee system based on the involvement of people/organisations directly involved in the organic supply chain is called a PGS (Participatory Guarantee System)” (PGS VN, 2018b).

<sup>e</sup> HACCP was mentioned to first apply in Vietnam for seafood around the 1990s due to the requirement of export markets (Cato (1998); Wikipedia HACCP (2018)).

<sup>f</sup> GMP was not popular at the time of survey (i.e. in terms of its visibility on the label), however, currently, it has been included as one of the standards on the label, in many cases HACCP and GMP are included simultaneously on the label. GMP was mentioned in the technical standard (QCVN 02-02:2009 /BNNPTNT) about “Fisheries Food Business Operators –HACCP Based Program for Quality and Safety Assurance” of the MARD in 2009.

<sup>g</sup> The hygienic conditions of compliance usually come with HACCP and other standards on the label. These are not really standard for food quality, but are used as compliance conditions.

### ***References of Table A1.1.***

Cato, J. C. (1998). Seafood safety: Economics of hazard analysis and critical control point (HACCP) programmes (No. 381). FAO.

Dam, N. D. (2015). Organic farm production in Vietnam: Current status and future prospective. Field Crops Research Institute (FCRI) and Vietnam Academy of Agricultural Sciences (VAAS).

European Commission (EC) (2018), Organic certification.

[https://ec.europa.eu/agriculture/organic/organic-farming/what-is-organic-farming/organic-certification\\_en](https://ec.europa.eu/agriculture/organic/organic-farming/what-is-organic-farming/organic-certification_en) (accessed 16.01.18).

EUROPA (2018), Organic farming.

[https://ec.europa.eu/agriculture/organic/sites/orgfarming/files/docs/body/organic\\_logo-faq\\_en.pdf](https://ec.europa.eu/agriculture/organic/sites/orgfarming/files/docs/body/organic_logo-faq_en.pdf) (accessed 16.01.18).

HACCP (1994), What HACCP really means. <http://haccpalliance.org/alliance/haccp.htm> (accessed 16.01.18).

IAF (International Accreditation Forum) (2013). <http://www.iaf.nu/upFiles/GLOBALG.A.P.pdf> (accessed 16.01.18).

IFOAM (2018), PGS Vietnam. <https://www.ifoam.bio/en/pgs-vietnam> (accessed 16.01.18).

Giang, H. T. T. (2015). Environment Friendly Agriculture and Organic Agriculture in Vietnam. National Agriculture and Food Research Organization (NARO), Japan.

GlobalGAP (2018), Cultivating the Future of the Planet. [https://www.globalgap.org/uk\\_en/for-producers/globalg.a.p./](https://www.globalgap.org/uk_en/for-producers/globalg.a.p/) (accessed 16.01.18)

PGS VN (2018a), Introduction. <http://vietnamorganic.vn/gioi-thieu?lang=eng> (accessed 16.01.18).

PGS VN (2018b), PGS certification. <http://vietnamorganic.vn/danh-sach-tin2/259/Pgs-Organic-certification.html> (accessed 16.01.18).

QMI-SAI Global (2018), GlobalGAP.

<http://www.qmi.com/registration/foodsafety/globalgap/Default.asp?language=english> (accessed 16.01.18).

QUACERT (National Certification Centre of Vietnam) (2016),

<http://www.quacert.gov.vn/en/crops.iso268.html> (accessed 20.01.16)..

Wikipedia HACCP (2018), HACCP. <https://vi.wikipedia.org/wiki/HACCP> (In Vietnamese) (accessed 16.01.18).

Wikipedia GMP (2018), Good manufacturing practice.  
[https://en.wikipedia.org/wiki/Good\\_manufacturing\\_practice](https://en.wikipedia.org/wiki/Good_manufacturing_practice) (accessed 16.01.18).

Will, M., & Guenther, D. (2007). Food quality and safety standards. *Eschborn: Deutsche Gesellschaft fuer Technische Zusammenarbeit (GTZ) GmbH*.

Table A1.2. Vietnamese household consumption 2010 on rice by area and consumption segment

Household Consumption 2010 on Rice by Country, Area and Consumption Segment in Local Currency, \$PPP, and US\$ (Million)							
Country	Area		Consumption Segment				
			All	Lowest	Low	Middle	Higher
Vietnam	National	Local Currency	112,937,821.94	75,930,819.84	34,351,019.56	2,594,383.70	61,598.85
		\$PPP	12,765.06	8,582.26	3,882.60	293.24	6.96
		US\$	6,067.71	4,079.47	1,845.55	139.39	3.31
	Rural	Local Currency	80,297,995.81	64,882,141.78	15,131,723.89	282,077.67	2,052.48
		\$PPP	9,075.87	7,333.46	1,710.30	31.88	0.23
		US\$	4,314.10	3,485.87	812.97	15.15	0.11
	Urban	Local Currency	32,639,826.13	11,048,678.06	19,219,295.67	2,312,306.03	59,546.37
		\$PPP	3,689.19	1,248.80	2,172.31	261.35	6.73
		US\$	1,753.61	593.60	1,032.58	124.23	3.20

Note: the four consumption segments: Lowest—below \$2.97 per capita a day; Low—between \$2.97 and \$8.44 per capita a day; Middle—between \$8.44 and \$23.03 per capita a day; Higher—above \$23.03 per capita a day. They are based on global income distribution data, which rank the global population by income per capita. The lowest consumption segment corresponds to the bottom half of the global distribution, or the 50th percentile and below; the low consumption segment to the 51th–75th percentiles; the middle consumption segment to the 76th–90th percentiles; and the higher consumption segment to the 91st percentile and above.

Estimates are annual. They are based on sample surveys. The sample size in some consumption segments—particularly the higher consumption segment—may be very small and not representative. \$PPP refer to international dollars from the 2005 ICP round. US\$ refer to US dollars (2010 average exchange rates were used to convert local currencies into US\$).

All surveys used have a nationwide coverage. Their sample size ranges from less than 2,000 households to more than 100,000. The universe of each survey is composed of ordinary households only; “institutional households” (prisons, military barracks, hospitals, convents, and others) are not covered by household surveys. Homeless and nomadic populations and visitors present in a country during a survey are also excluded from the sample.

Source: <http://datatopics.worldbank.org/consumption/product/Rice> (accessed 18.10.17).

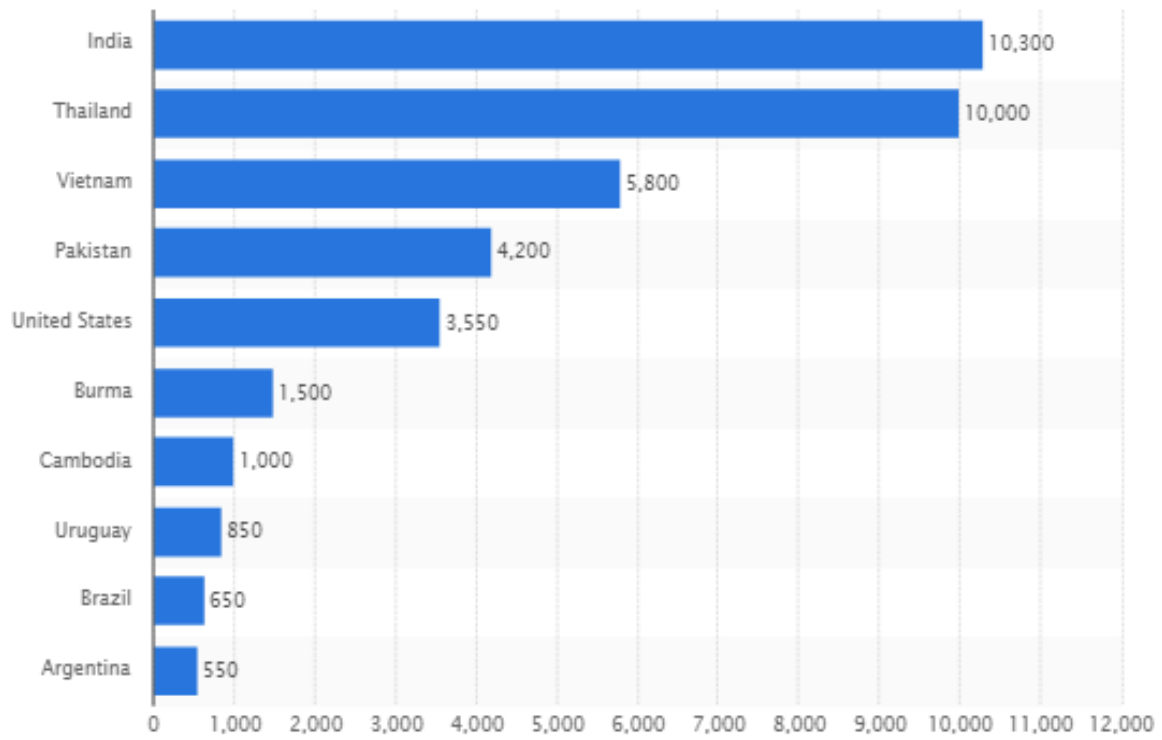


Figure A1.1. Principal rice exporting countries worldwide in 2016/2017 (1000 metric tons)  
(Source: Statista, 2017)

## Appendix A2. 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/globalgap/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>)

## Appendix A3.

Table A3.1. Characteristics of the sample and of the population (% , unless specified)

	Our sample (n=500, June, July 2015)	Country (GSO)	Ho Chi Minh (GSO)	Can Tho (GSO)
Gender (1000 persons)		90729		
Male (1000 persons)	-	44758	3891.1 (in 2015)	621.3 (in 2015)
Female (1000 persons)	-	45971	4236.8 (in 2015)	626.7 (in 2015)
Gender (persons) in urban area	500	30035 (in 1000)	6632.8 (in 1000, 2015)	833.0 (in 1000, 2015)
Male (persons)	84	N.A.	N.A.	N.A.
Female (persons)	416	N.A.	N.A.	N.A.
Age	100.0	100.0 <sup>1</sup>		
<=30 years	21.2	27.5	N.A.	N.A.
31-54 years	64.8	51.0	N.A.	N.A.
>=55 years	14.0	21.5	N.A.	N.A.
Education	100.0	100.0 <sup>2</sup>	100.0 <sup>3</sup>	100.0 (in 2011) <sup>6</sup>
Non specialized	51.0	70.0	47.0	55.0
Specialized (have training, some college, higher education)	49.0	30.0	53.0	45.0
Working status	100.0	-	100.0 <sup>4</sup>	100.0 <sup>4</sup>
Have a job	65.6	-	61.7	70.1
Unemployed	0.8	-	2.1	1.8
No economic activity	33.6 <sup>5</sup>	-	36.2	28.2

(Sources: GSO, 2014, 2015), N.A.: not available, The first column describes our sample characteristics; In the last three columns data were obtained from the GSO in 2014 otherwise specified in detail (e.g., in 2015, or in the superscript notes).

<sup>1</sup> This is based on GSO (2014) of the population of the country including those from 19 years on and own calculation.

<sup>2</sup> This is based on GSO (2014) of the population of the country in urban areas including those from 15 years on.

<sup>3</sup> This is based on FALMI and HCM SO (2016) of the population of Ho Chi Minh city from 15 years on and own calculation.

<sup>4</sup> This is based on GSO (2014) working status of population from 15 years on in urban areas.

<sup>5</sup> This includes no economic activity (21.4%), retired (7.8%), student (4.4%).

<sup>6</sup> In 2011, it was estimated that Can Tho city had about 45% of trained labour (e.g. training, college, higher education) (Tanh, 2013). This means the non-specialized labour in Can Tho was about 55% in 2011. In 2016, the non-specialized labour is expected to be decreased, while labour with college and higher education should be increased, compared to 2011.

### References of Table A3.1 and Table A4.1

General Statistics Office of Vietnam (GSO) (2014), <http://www.gopfp.gov.vn/20265> (accessed 16.12.17)  
& [https://www.gso.gov.vn/Modules/Doc\\_Download.aspx?DocID=18962](https://www.gso.gov.vn/Modules/Doc_Download.aspx?DocID=18962) (accessed 16.12.17)  
& [https://www.gso.gov.vn/Modules/Doc\\_Download.aspx?DocID=18151](https://www.gso.gov.vn/Modules/Doc_Download.aspx?DocID=18151) (accessed 16.12.17)  
& <http://www.gso.gov.vn/default.aspx?tabid=714> (accessed 16.12.17)  
& <http://www.gso.gov.vn> (accessed 16.12.17).

General Statistics Office of Vietnam (GSO) (2015), <http://www.gso.gov.vn> (accessed 16.12.17).

Tanh, H.V. (2013). "Phat trien nguon nhan luc chat luong cao o thanh pho Can Tho hien nay". *Tap Chi Giao Duc Ly Luan*, 206, 81-84. (In Vietnamese) <http://www.cantholib.org.vn/Database/Content/1251.pdf> (accessed 16.12.17).

FALMI (Center of Forecasting Manpower Needs and Labor Market Information) HCMC (2016) <http://www.dubaonhanluchcmc.gov.vn/tin-tuc/6320.thi-truong-lao-dong-nam-2016-du-bao-nhu-cau-nhan-luc-nam-2017-tai-thanh-pho-ho-chi-minh.html> (accessed 22.01.18). Based on the statistics from HCM SO (Ho Chi Minh city's Statistical Office, a branch of General Statistics Office of Vietnam in HCM city). 195

## Appendix A4.

Table A4.1. Characteristics of the sample and of the population (% , unless specified)

	Our sample (n=199, August 2016)	Country (GSO)	Ho Chi Minh (GSO)	Can Tho (GSO)
Gender (1000 persons)	-	90729		
Male (1000 persons)	-	44758	3891.1 (in 2015)	621.3 (in 2015)
Female (1000 persons)	-	45971	4236.8 (in 2015)	626.7 (in 2015)
Gender (persons) in urban area		30035 (in 1000)	6632.8 (in 1000, 2015)	833.0 (in 1000, 2015)
Male (persons)	27	N.A.	N.A.	N.A.
Female (persons)	172	N.A.	N.A.	N.A.
Age	100.0	100.0 <sup>1</sup>		
<=30 years	10.6	15.6	N.A.	N.A.
31-54 years	68.8	59.4	N.A.	N.A.
>=55 years	20.6	25.0	N.A.	N.A.
Education	100.0	100.0 <sup>2</sup>	100.0 <sup>3</sup>	100.0 (in 2011) <sup>4</sup>
Non specialized	48.2	70.0	47.0	55.0
Specialized (have training, some college, higher education)	51.8	30.0	53.0	45.0

(Sources: GSO, 2014, 2015), N.A.: not available. The first column describes our sample characteristics; In the last three columns data were obtained from the GSO in 2014 otherwise specified in detail (e.g., in 2015, or in the superscript notes).

<sup>1</sup>This is based on the GSO (2014) for the population of the country including those from 25 years on and own calculation.

<sup>2</sup> This is based on GSO (2014) of the population of the country in urban areas including those from 15 years on.

<sup>3</sup> This is based on FALMI and HCM SO (2016) of the population of Ho Chi Minh city from 15 years on and own calculation.

<sup>4</sup>In 2011, it was estimated that Can Tho city had about 45% of trained labour (e.g. training, college, higher education) (Tanh, 2013). This means the non-specialized labour in Can Tho was about 55% in 2011. In 2016, the non-specialized labour is expected to be decreased, while labour with college and higher education should be increased, compared to 2011.

**References of Table A4.1 have been mentioned under Table A3.1.**



## Appendix A5.

Table A5.1 Chi-square test of trust in the food quality certification system and purchase of certified rice (% , n=199)

	Non buyer	Buyer	All	Pearson Chi-square	p-value
Not completely trust	87.4	65.4	75.9	13.11	<0.001
Completely trust	12.6	34.6	24.1		

Table A5.2 Chi-square test of perceived self-competence and purchase of certified rice (% , n=199)

	Non buyer	Buyer	All	Pearson Chi-square	p-value
Low competence	51.6	17.3	33.7	45.48	<0.001
Medium competence	38.9	31.7	35.2		
High competence	9.5	51.0	31.2		

Perceived self-competence was measured from (1) to (7). “Low competence” applied for scores < 4.0, “Medium competence” applied for scores  $\geq 4.0$  and  $\leq 5.0$ , “High competence” applied for scores > 5.0.

## Appendix A6. Information about the attributes included in the study

<p><i>Production method</i></p> <ul style="list-style-type: none"><li>• Conventional: Farmers use pesticides and chemical inputs according to their subjective ideas.</li><li>• IPM: “IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means” (US-EPA, 2011). IPM allows the use of agrichemicals, such as pesticides, according to correct directions and regulations in order to have the minimum impact on human health and the environment (US-EPA, 2011).</li><li>• Organic: This method “applies many of the same concepts as IPM but limits the use of pesticides to those that are produced from natural sources, as opposed to synthetic chemicals” (US-EPA, 2011).</li></ul>
<p><i>Health benefits</i></p> <p>Indicating the health benefits of rice with the claim “Rich in vitamins and other nutrients”. Examples are rice that is rich in vitamins (such as vitamin A), and other nutrients such as omega (such as omega 6, 9), and calcium, iron, fiber, etc.</p> <p>Two levels are provided:</p> <ul style="list-style-type: none"><li>• “Rich in vitamins and other nutrients” is present.</li><li>• “Rich in vitamins and other nutrients” is not present.</li></ul>
<p><i>Fair farmer prices</i></p> <p>Indicating whether farmers receive a fair price compared to other actors in the supply chain for rice (for example, as compared to intermediaries such as wholesalers, distributors, selling agents, retailers).</p> <p>Two levels are provided:</p> <ul style="list-style-type: none"><li>• Fair: farmers receive a fair price compared to other actors.</li><li>• No information is provided: farmers do not receive a fair price compared to other actors.</li></ul>
<p><i>Price</i></p> <p>Price per 1 kg</p>

Appendix A7.  
Figures. A7.1-A7.2

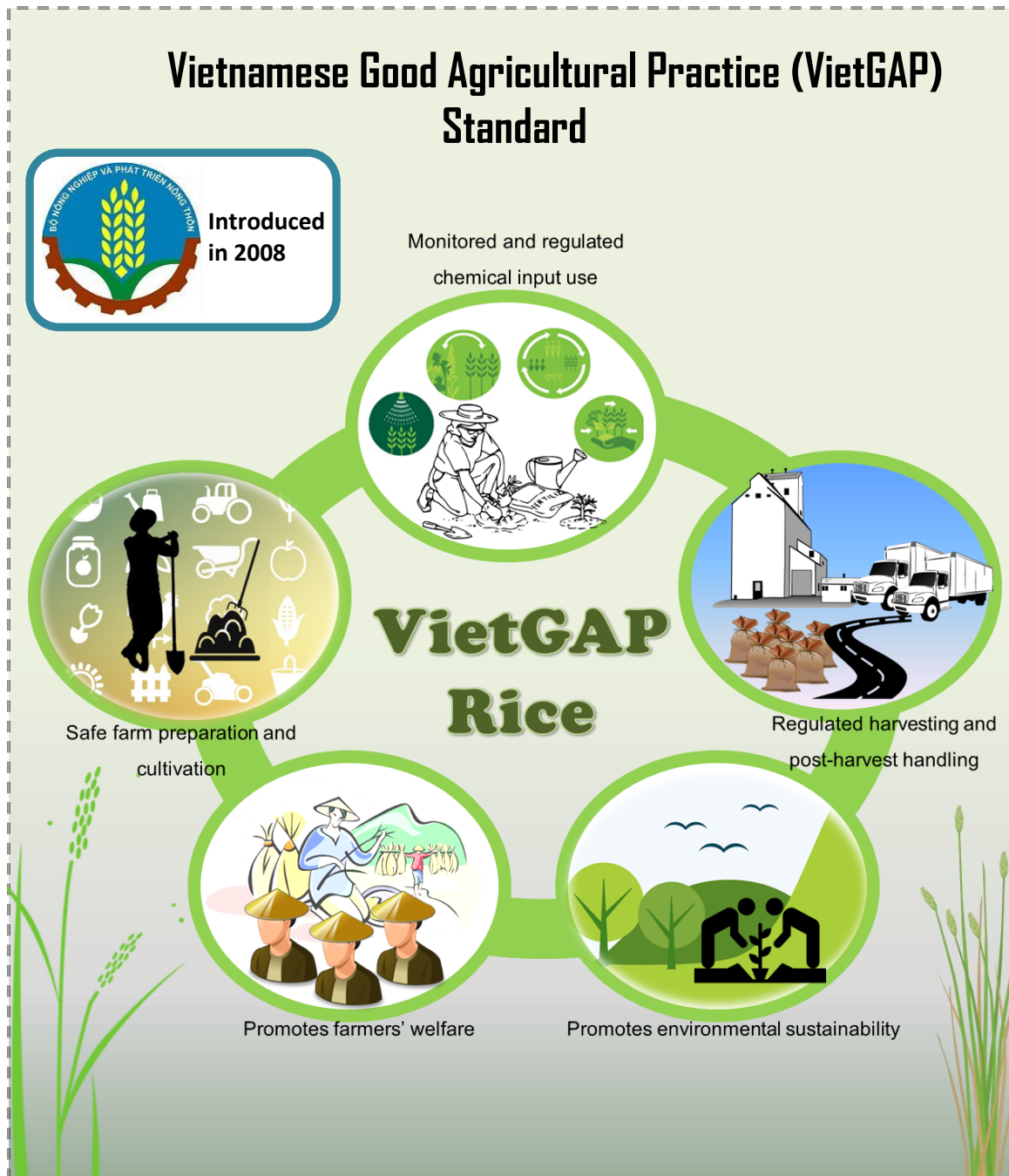


Figure A7.1. Supplementary information: VietGAP flyer

# Vietnamese Good Agricultural Practice (VietGAP) Standard



Monitored and regulated chemical input use



Safe farm preparation and cultivation



Regulated harvesting and post-harvest handling

## VietGAP Rice



Promotes farmers' welfare



Promotes environmental sustainability

### Clear traceability on the product label



PLACE OF CULTIVATION



PLACE OF PACKAGING



DISTRIBUTOR'S ADDRESS



RETAILER'S ADDRESS

BATCH NUMBER



MFG: dd/mm/yyyy  
EXP: dd/mm/yyyy

Figure A7.2. Supplementary information: VietGAP flyer and traceability component

## Appendix A8.

Table A8.1. Consumers' characteristics across control and different treatments  
(%, unless specified in detail)

	Total (n=199)	Control (n=50)	Treatment 1 (n=49)	Treatment 2 (n=51)	Treatment 3 (n=49)	$\chi^2 / F$	p-value
Gender						1.792	0.617
Male	13.6	16.0	16.3	13.7	8.2		
Female	86.4	84.0	83.7	86.3	91.8		
Education						0.698	0.874
High school and lower levels	48.2	44.0	51.0	51.0	46.9		
Higher education and above	51.8	56.0	49.0	49.0	53.1		
Income (self-reported)						0.445	0.931
Medium and lower	52.3	54.0	49.0	54.9	51.0		
Upper-middle	47.7	46.0	51.0	45.1	49.0		
Age (years)	45.38	44.96	44.45	46.73	45.33	0.440	0.725
Hh size (persons)	4.60	4.61	4.33	4.20	4.44	0.680	0.565



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## References

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- Abdul-Muhmin, A. G. (2007). Explaining consumers' willingness to be environmentally friendly. *International Journal of Consumer Studies*, 31(3), 237-247.
- Akaichi, F., Gil, J. M., & Nayga, R. M. (2012). Assessing the market potential for a local food product: Evidence from a non-hypothetical economic experiment. *British Food Journal*, 114(1), 19-39.
- Akaichi, F., de Grauw, S., Darmon, P., & Revoredo-Giha, C. (2016). Does fair trade compete with carbon footprint and organic attributes in the eyes of consumers? Results from a pilot study in Scotland, the Netherlands and France. *Journal of Agricultural and Environmental Ethics*, 29(6), 969-984.
- Akaichi, F., Nayga Jr, R. M., & Nalley, L. L. (2017). Are there trade-offs in valuation with respect to greenhouse gas emissions, origin and food miles attributes?. *European Review of Agricultural Economics*, 44(1), 3-31.
- Akoa Etoa, J. M., Ndindeng, S. A., Owusu, E. S., Woin, N., Bindzi, B., & Demont, M. (2016). Consumer valuation of an improved rice parboiling technology: Experimental evidence from Cameroon. *African Journal of Agricultural and Resource Economics*, 11(1), 8-21.
- Alavi, H. R., Htenas, A., Kopicki, R., Shepherd, A. W., & Clarete, R. (2012). Trusting trade and the private sector for food security in Southeast Asia, Washington DC: The World Bank, 259p, p233.
- Alba, J. W., & Hutchinson, J. W. (1987). Dimensions of consumer expertise. *Journal of Consumer Research*, 13(4), 411-454.
- Allport, G. W. (1935). Attitudes. In: Murchison, C. (Ed.), *A handbook of social psychology*, Clark University Press, Worcester, pp. 798-844.
- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modelling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103(3), 411-423.
- Anh, P. H. (2015). Food safety in Vietnam – Opportunities for food testing technology. Switzerland Global Enterprise. <http://www.s-ge.com/schweiz/export/de/node/220626> (accessed 08.03.17).
- Anh, D. T., & Vang, N. N. (2015). Rice value chain study in Mekong river delta, Vietnam. *Journal of Science – 2015 - An Giang University*, 2(2), 36-46, ISSN 0866 - 8086.
- Anthony, E. J., Brunier, G., Besset, M., Goichot, M., Dussouillez, P., & Nguyen, V. L. (2015). Linking rapid erosion of the Mekong River delta to human activities. *Scientific Reports*, 5, srep14745, 1-12.
- Asia Development Bank (ADB) (2012), Detailed food safety management issues section assessment. In: Trade facilitation: Improved sanitary and phytosanitary handling in greater Mekong subregion trade project (RRP REG 43120), <https://www.adb.org/sites/default/files/linked-documents/43120-025-vie-oth-02.pdf> (accessed 20.01.18)
- Aung, M. M., & Chang, Y. S. (2014). Traceability in a food supply chain: Safety and quality perspectives. *Food Control*, 39, 172-184.
- Avitia, J., Costa-Font, M., & Gil, J. M. (2007). Structural equation modelling of consumer acceptance of organic food in Spain. *Universitat Politècnica de Catalunya CREDA*, 8, 1-36.
- Bach, V. N., Pham, C. H., & Vo, N. H. (2016). A critical analysis of the value chain in the rice industry and its effects on the export rice industry in Kien Giang province, Vietnam. *International Journal of Financial Research*, 7(3), 1-12, E-ISSN 1923 – 4031.

- Batte, M. T., Hooker, N. H., Haab, T. C., & Beaverson, J. (2007). Putting their money where their mouths are: Consumer willingness to pay for multi-ingredient, processed organic food products. *Food Policy*, 32(2), 145-159.
- Barry, T. E., & Howard, D. J. (1990). A review and critique of the hierarchy of effects in advertising. *International Journal of Advertising*, 9(2), 121-135.
- Bazoche, P., Combris, P., Giraud-Héraud, E., Seabra Pinto, A., Bunte, F., & Tsakiridou, E. (2014). Willingness to pay for pesticide reduction in the EU: Nothing but organic?. *European Review of Agricultural Economics*, 41(1), 87-109.
- Bhat, R. (2017). Food sustainability challenges in the developing world. In: Bhat, R. (Ed.), *Sustainability challenges in the agrofood sector*, UK: John Wiley & Sons.
- Becker, T. (2000). Consumer perception of fresh meat quality: A framework for analysis. *British Food Journal*, 102(3), 158-176.
- Becker, G. M., DeGroot, M. H., & Marschak, J. (1964). Measuring utility by a single-response sequential method. *Systems Research and Behavioural Science*, 9(3), 226-232.
- Becker, N., Tavor, T., Friedler, L., & Bar, P. (2015). Two stages decision process toward organic food: The case of organic tomatoes in Israel. *Agroecology and Sustainable Food Systems*, 39(3), 342-361.
- Bem, D. J. (1972). Self-perception theory. In: Berkowitz, L. (Ed.), *Advances in experimental social psychology*, New York: Academic Press, Vol. 6, pp. 1-62.
- Berg, H., & Tam, N. T. (2018). Decreased use of pesticides for increased yields of rice and fish- options for sustainable food production in the Mekong Delta. *Science of The Total Environment*, 619, 319-327.
- Berg, H., Berg, C., & Tam, N. T. (2012). Integrated rice-fish farming: Safeguarding biodiversity and ecosystem services for sustainable food production in the Mekong Delta. *Journal of Sustainable Agriculture*, 36(8), 859-872.
- Berg, H., Söderholm, A. E., Söderström, A. S., & Tam, N. T. (2017). Recognizing wetland ecosystem services for sustainable rice farming in the Mekong Delta, Vietnam. *Sustainability Science*, 12(1), 137-154.
- Berry, J., Fischer, G., Guiteras, R. P. (2015). Eliciting and utilizing willingness-to-pay: Evidence from field trials in Northern Ghana. <http://personal.lse.ac.uk/fischerg/Assets/BFG-EUWTP.pdf> (accessed 30.10.17).
- Bhattacharya, K. R., & Ali, S. Z. (2016). On rice and the region of rice civilization. *International Journal of Sociology and Anthropology*, 8(8), 65-75.
- Bialkova, S., & van Trijp, H. (2010). What determines consumer attention to nutrition labels?. *Food Quality and Preference*, 21(8), 1042-1051.
- Birol, E., Roy, D., Deffner, K., & Karandikar, B. (2009). Developing country consumers' demand for food safety and quality: Is Mumbai ready for certified and organic fruits?. *Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference*, Beijing, China.
- Bliemer, M. C., Rose, J. M., & Hess, S. (2008). Approximation of Bayesian efficiency in experimental choice designs. *Journal of Choice Modelling*, 1(1), 98-126.
- Bollen, K. A. (1989). *Structural Equations with Latent Variables*, New York: John Wiley & Sons.

- Bornstein, M. H., Jager, J., & Putnick, D. L. (2013). Sampling in developmental science: Situations, shortcomings, solutions, and standards. *Developmental Review, 33*(4), 357-370.
- Bratanova, B., Vauclair, C. M., Kervyn, N., Schumann, S., Wood, R., & Klein, O. (2015). Savouring morality. Moral satisfaction renders food of ethical origin subjectively tastier. *Appetite, 91*, 137-149.
- Breidert, C., Hahsler, M., Reutterer, T. (2006). A review of methods for measuring willingness-to-pay. *Innovative Marketing, 2*(4), 8-32.
- Budiani, N. P. A., Suastuti, N. L., & Massenga, L. M. (2016). Marketing strategies for organic restaurant in Ubud tourist area - Bali. *Journal of Business on Hospitality and Tourism, 2*(1), 409-418.
- Bui, M. T. T., & Preechametta, A. (2016). Land inequality or productivity: What mattered in Southern Vietnam after 1975?. *Asia & the Pacific Policy Studies, 3*(2), 300-319.
- Burke, M. C., & Edell, J. A. (1989). The impact of feelings on ad-based affect and cognition. *Journal of Marketing Research, 69*-83.
- Buu, P. (2015). Pesticide overuse a top food safety concern. Vietnamnews – The National English Language Daily. <http://vietnamnews.vn/environment/276348/pesticide-overuse-a-top-food-safety-concern.html#7YZT8272gpIFWMgQ.97> (accessed 08.03.17).
- Çabuk, S., Tanrikulu, C., & Gelibolu, L. (2014). Understanding organic food consumption: Attitude as a mediator. *International Journal of Consumer Studies, 38*(4), 337-345.
- Carmines, E., & McIver, J. (1981). Analysing models with unobserved variables: Analysis of covariance structures. In: Bohrnstedt, G. W., & Borgatta, E. F. (Eds.), *Social measurement - Current issues*, Beverly Hills: Sage Publications Inc. (254), pp. 65–115.
- Campbell, D., Hutchinson, W. G., & Scarpa, R. (2006). Lexicographic preferences in discrete choice experiments: Consequences on individual specific willingness to pay estimates. FEEM Working Paper No. 128.06. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=936933](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=936933) (accessed 30.10.17).
- Canales, C. (2011). Poverty reduction and trade: Fairtrade as a vehicle to combat poverty. FairTrade International. [https://www.fairtrade.net/fileadmin/user\\_upload/content/2009/resources/2011-05-29\\_flo\\_poverty\\_trade\\_final.pdf](https://www.fairtrade.net/fileadmin/user_upload/content/2009/resources/2011-05-29_flo_poverty_trade_final.pdf) (accessed 20.10.16).
- Carrillo, E., Varela, P., Salvador, A., & Fiszman, S. (2011). Main factors underlying consumers' food choice: A first step for the understanding of attitudes toward “healthy eating”. *Journal of Sensory Studies, 26*(2), 85-95.
- Cao, S., Lv, Y., Zheng, H., & Wang, X. (2015). Research of the risk factors of China's unsustainable socioeconomic development: Lessons for other nations. *Social Indicators Research, 123*(2), 337-347.
- Chaudhuri, A., & Holbrook, M. B. (2001). The chain of effects from brand trust and brand affect to brand performance: The role of brand loyalty. *Journal of Marketing, 65*(2), 81-93.
- Consultative Group in International Agricultural Research (CGIAR) (2016), The drought and salinity intrusion in the Mekong river delta of Vietnam. <https://cgspace.cgiar.org/rest/bitstreams/78534/retrieve> (accessed 20.09.17).
- Chau, H. L. Q., Thong, H. T., Chao, N. V., Hung, P. H. S., Hai, V. V., Fujieda, A., Ueru, T., & Akamatsu, M. (2014). Microbial and parasitic contamination on fresh vegetables sold in

- traditional markets in Hue city, Vietnam. *Journal of Food and Nutrition Research*, 2(12), 959-964.
- Chen, J., Lobo, A., & Rajendran, N. (2014). Drivers of organic food purchase intentions in mainland China—evaluating potential customers' attitudes, demographics and segmentation. *International Journal of Consumer Studies*, 38(4), 346-356.
- Chen, K., Wang, X. X., & Song, H. Y. (2015). Food safety regulatory systems in Europe and China: A study of how co-regulation can improve regulatory effectiveness. *Journal of Integrative Agriculture*, 14(11), 2203-2217.
- Chrysochoidis, G. (2000). Repercussions of consumer confusion for late introduced differentiated products. *European Journal of Marketing*, 34(5/6), 705-722.
- Coulson, N. S. (2000). An application of the stages of change model to consumer use of food labels. *British Food Journal*, 102(9), 661-668.
- Cuevas, R. P., Pede, V. O., McKinley, J., Velarde, O., & Demont, M. (2016). Rice grain quality and consumer preferences: A case study of two rural towns in the Philippines. *Plos One*, 11(3), e0150345.
- Cummings, R. G., & Taylor, L. O. (1999). Unbiased value estimates for environmental goods: A cheap talk design for the contingent valuation method. *The American Economic Review*, 89(3), 649-665.
- Cuong, T. V., Mai, N. T. H., Hieu, N. Q., Phuong, T. T. T., & Henson, S. (2013). Using multi criteria decision analysis to identify and prioritise export-related sanitary and phytosanitary capacity-building options in Vietnam. [http://www.standardsfacility.org/sites/default/files/Vietnam\\_MCDA\\_report\\_June2013.pdf](http://www.standardsfacility.org/sites/default/files/Vietnam_MCDA_report_June2013.pdf) (accessed 09.06.17)
- Custodio, M. C., Cuevas, R. P., Ynion, J., Laborte, A., Velasco, L., & Demont, M. (2018). Rice quality: From consumers to genetics. *Trends in Food Science and Technology*. (Under review)
- Daly, A., Hess, S., & Train, K. (2012). Assuring finite moments for willingness to pay in random coefficient models. *Transportation*, 39(1), 19-31.
- Dao, T. (2016). Vietnam suspends rice exports to US after pesticide violations. *Vnexpress International*. <http://e.vnexpress.net/news/business/vietnam-suspends-rice-exports-to-us-after-pesticide-violations-3476874.html> (accessed 17.03.17).
- De Groote, H., Kimenju, S. C., & Morawetz, U. B. (2011). Estimating consumer willingness to pay for food quality with experimental auctions: The case of yellow versus fortified maize meal in Kenya. *Agricultural Economics*, 42(1), 1-16.
- de Haen, H., & Réquillart, V. (2014). Linkages between sustainable consumption and sustainable production: Some suggestions for foresight work. *Food Security*, 6(1), 87-100.
- 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.
- Demont, M., Zossou, E., Rutsaert, P., Ndour, M., Van Mele, P., & Verbeke, W. (2012). Consumer valuation of improved rice parboiling technologies in Benin. *Food Quality and Preference*, 23(1), 63-70.
- Demont, M., Rutsaert, P., Ndour, M., & Verbeke, W. (2013a). Reversing urban bias in African rice markets: Evidence from Senegal. *World Development*, 45, 63-74.

- Demont, M., Rutsaert, P., Ndour, M., Verbeke, W., Seck, P. A., & Tollens, E. (2013b). Experimental auctions, collective induction and choice shift: Willingness-to-pay for rice quality in Senegal. *European Review of Agricultural Economics*, 40(2), 261-286.
- Demont, M., & Ndour, M. (2015). Upgrading rice value chains: Experimental evidence from 11 African markets. *Global Food Security*, 5, 70-76.
- Demont, M., & Rutsaert, P. (2017). Restructuring the Vietnamese rice sector: Towards increasing sustainability. *Sustainability*, 9(2), 325, su9020325.
- Demont, M., Fiamohe, R., & Kinkpé, A. T. (2017). Comparative advantage in demand and the development of rice value chains in West Africa. *World Development*, 96, 578-590.
- Depositario, D. P. T., Nayga Jr, R. M., Wu, X., & Laude, T. P. (2009). Effects of information on consumers' willingness to pay for golden rice. *Asian Economic Journal*, 23(4), 457-476.
- De Steur, H., Gellynck, X., Storozhenko, S., Liqun, G., Lambert, W., Van Der Straeten, D., & Viaene, J. (2010). Health impact in China of folate-biofortified rice. *Nature biotechnology*, 28(6), 554-556.
- De Steur, H., Gellynck, X., Feng, S., Rutsaert, P., & Verbeke, W. (2012a). Determinants of willingness-to-pay for GM rice with health benefits in a high-risk region: Evidence from experimental auctions for folate biofortified rice in China. *Food Quality and Preference*, 25(2), 87-94.
- De Steur, H., Gellynck, X., Blancquaert, D., Lambert, W., Van Der Straeten, D., & Qaim, M. (2012b). Potential impact and cost-effectiveness of multi-biofortified rice in China. *New Biotechnology*, 29(3), 432-442.
- De Steur, H., Buysse, J., Feng, S., & Gellynck, X. (2013). Role of information on consumers' willingness-to-pay for genetically-modified rice with health benefits: An application to China. *Asian Economic Journal*, 27(4), 391-408.
- De Steur, H., Wesana, J., Blancquaert, D., Der Straeten, D., & Gellynck, X. (2017a). Methods matter: A meta-regression on the determinants of willingness-to-pay studies on biofortified foods. *Annals of the New York Academy of Sciences*, 1390(1), 34-46.
- De Steur, H., Demont, M., Gellynck, X., & Stein, A. J. (2017b). The social and economic impact of biofortification through genetic modification. *Current Opinion in Biotechnology*, 44, 161-168.
- Diagne, M., Demont, M., & Ndour, M. (2017). What is the value of rice fragrance? Consumer evidence from Senegal. *African Journal of Agricultural and Resource Economics*, 12(2), 99-110.
- Didier, T., & Lucie, S. (2008). Measuring consumer's willingness to pay for organic and fair trade products. *International Journal of Consumer Studies*, 32(5), 479-490.
- Dipti, S. S., Bergman, C., Indrasari, S. D., Herath, T., Hall, R., Lee, H., Habibi, F., Bassinello, P. Z., Graterol, E., Ferraz, J. P., & Fitzgerald, M. (2012). The potential of rice to offer solutions for malnutrition and chronic diseases. *Rice*, 5(1), 16.
- Dhar, R., & Simonson, I. (2003). The effect of forced choice on choice. *Journal of Marketing Research*, 40(2), 146-160.
- Dou, L., Yanagishima, K., Li, X., Li, P., & Nakagawa, M. (2015). Food safety regulation and its implication on Chinese vegetable exports. *Food Policy*, 57, 128-134.

- Dowd, K., & Burke, K. J. (2013). The influence of ethical values and food choice motivations on intentions to purchase sustainably sourced foods. *Appetite*, *69*, 137-144.
- Druckman, D., & Bjork, R. A. (1994). Self-confidence and performance. In: Druckman, D., & Bjork, R. A. (Eds.), *Learning, remember, believing: Enhanced human performance*. Washington, DC: National Academy Press.
- Earle, T. C., & Cvetkovich, G. (1995). *Social trust: Toward a cosmopolitan society*. Greenwood Publishing Group.
- Eden, S., Bear, C., & Walker, G. (2008). Understanding and (dis) trusting food assurance schemes: Consumer confidence and the 'knowledge fix'. *Journal of Rural Studies*, *24*(1), 1-14.
- Ergin, E. A., & Ozsacmaci, B. (2011). Turkish consumers' perceptions and consumption of organic foods. *African Journal of Business Management*, *5*(3), 910-914.
- European Commission (EC) (2000), Proposal for a Regulation of the European Parliament and of the Council on the hygiene of foodstuffs. [http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52000PC0438\(01\)](http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52000PC0438(01)) (accessed 16.01.18).
- European Commission (EC) (2012), Policies to encourage sustainable consumption. [http://ec.europa.eu/environment/eussd/pdf/report\\_22082012.pdf](http://ec.europa.eu/environment/eussd/pdf/report_22082012.pdf) (accessed 28.01.18).
- EUROPA (2016), Guide to the EU-Vietnam free trade agreement. [http://trade.ec.europa.eu/doclib/docs/2016/june/tradoc\\_154622.pdf](http://trade.ec.europa.eu/doclib/docs/2016/june/tradoc_154622.pdf) (accessed 18.10.17).
- EUROPA (2017), Agri-food trade statistical factsheet: European Union – Vietnam. [https://ec.europa.eu/agriculture/sites/agriculture/files/trade-analysis/statistics/outside-eu/countries/agrifood-vietnam\\_en.pdf](https://ec.europa.eu/agriculture/sites/agriculture/files/trade-analysis/statistics/outside-eu/countries/agrifood-vietnam_en.pdf) (accessed 18.10.17).
- European Crop Protection Association (ECPA) (2017), Integrated Pest Management. [http://www.ecpa.eu/reports\\_infographics/integrated-pest-management-ipm](http://www.ecpa.eu/reports_infographics/integrated-pest-management-ipm) (accessed 30.08.17).
- Fandos, C., & Flavian, C. (2006). Intrinsic and extrinsic quality attributes, loyalty and buying intention: An analysis for a PDO product. *British Food Journal*, *108*(8), 646-662.
- Farah, A. A., Zainalabidin, M., & Ismail, A. L. (2011). The influence of socio-demographic factors and product attributes on attitudes toward purchasing special rice among Malaysian consumers. *International Food Research Journal*, *18*(3).
- Feldkamp, T. J., Schroeder, T. C., & Lusk, J. L. (2005). Determining consumer valuation of differentiated beef steak quality attributes. *Journal of Muscle Foods*, *16*(1), 1-15.
- Fiebig, D. G., Keane, M. P., Louviere, J., & Wasi, N. (2010). The generalized multinomial logit model: Accounting for scale and coefficient heterogeneity. *Marketing Science*, *29*(3), 393-421.
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research*. Addison-Wesley Publishing Company: Reading.
- Fiore, A. M., & Kim, J. (2007). An integrative framework capturing experiential and utilitarian shopping experience. *International Journal of Retail & Distribution Management*, *35*(6), 421-442.
- Flint, A., Raben, A., Blundell, J. E., & Astrup, A. (2000). Reproducibility, power and validity of visual analogue scales in assessment of appetite sensations in single test meal studies. *International Journal of Obesity*, *24*(1), 38.
- Food and Agriculture Organization of the United Nations (FAO) (1998), Defining organic agriculture. <http://www.fao.org/docrep/003/ac116e/ac116e02.htm> (accessed 20.06.17).

- FAO (2014a), Rice Market Monitor. December 2014 Volume XVII, Issue No. 4. <http://www.fao.org/3/a-i4294e.pdf> (accessed 30.01.17).
- FAO (2014b), A regional rice strategy for sustainable food security in Asia and the Pacific. <http://www.fao.org/3/a-i3643e.pdf> (accessed 20.06.17).
- FAO (2018), Organic Agriculture. <http://www.fao.org/organicag/oa-faq/oa-faq5/en/> (accessed 28.01.18).
- Forsyth, R. (2014). Producing countries are new markets for Fairtrade products, according to annual report. ISEAL Alliance. <http://www.isealalliance.org/online-community/news/producing-countries-are-new-markets-for-fairtrade-products-according-to-annual-report> (accessed 20.08.16).
- Forsythe, S. J. (2000). Food safety management tools. In: Forsythe, S. J. (Ed.), *The microbiology of safe food*, Blackwell Science Ltd., pp. 256-295.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50.
- Frez-Muñoz, L., Steenbekkers, B. L., & Fogliano, V. (2016). The choice of canned whole peeled tomatoes is driven by different key quality attributes perceived by consumers having different familiarity with the product. *Journal of Food Science*, 81(12), 2988-2996.
- Frewer, L. J., Fischer, A. R. H., Brennan, M., Bánáti, D., Lion, R., Meertens, R. M., Rowe, G., Siegrist, M., Verbeke, W., & Vereijken, C. M. (2016). Risk/benefit communication about food—a systematic review of the literature. *Critical Reviews in Food Science and Nutrition*, 56(10), 1728-1745.
- FSAI (Food Safety Authority of Ireland) (2018), Types of Hazards. [https://www.fsai.ie/food\\_businesses/haccp/types\\_of\\_hazards.html](https://www.fsai.ie/food_businesses/haccp/types_of_hazards.html) (accessed 26.01.18).
- Gao, Z., & Schroeder, T. C. (2009). Effects of label information on consumer willingness-to-pay for food attributes. *American Journal of Agricultural Economics*, 91(3), 795-809.
- Garcia-Casal, M. N., Peña-Rosas, J. P., & Giyose, B. (2017). Staple crops biofortified with increased vitamins and minerals: Considerations for a public health strategy. *Annals of the New York Academy of Sciences*, 1390(1), 3-13.
- Garcia-Yi, J. (2015). Willingness to pay for organic and Fairtrade certified yellow chili peppers: Evidence from middle and high income districts in Lima, Peru. *British Food Journal*, 117(2), 929-942.
- Global Food Safety Resource (GFSR) (2016), Food safety audits. <http://globalfoodsafetyresource.com/food-safety/food-safety-audits#> (accessed 26.01.18).
- Giddens, A. (1990). *The consequences of modernity*. UK: Polity Press, Blackwell-Publishers Ltd.
- GlobalG.A.P. (2017), Mission and system: Overview. [http://www1.GLOBALG.A.P..org/north-america/front\\_content.php?idcat=285](http://www1.GLOBALG.A.P..org/north-america/front_content.php?idcat=285) & Producers/Suppliers – General. [http://www1.GLOBALG.A.P..org/north-america/front\\_content.php?idcat=291](http://www1.GLOBALG.A.P..org/north-america/front_content.php?idcat=291) (accessed 22.03.17).
- Grace, D. (2015). Food safety in low and middle income countries. *International Journal of Environmental Research and Public Health*, 12(9), 10490-10507.
- Gracia, A., Loureiro, M. L., & Nayga, R. M. (2009). Consumers' valuation of nutritional information: A choice experiment study. *Food Quality and Preference*, 20(7), 463-471.

- Gracia, A., & de Magistris, T. (2007). Organic food product purchase behaviour: A pilot study for urban consumers in the South of Italy. *Spanish Journal of Agricultural Research* 5(4), 439-451.
- Grankvist, G., & Biel, A. (2007). Predictors of purchase of eco-labelled food products: A panel study. *Food Quality and Preference*, 18(4), 701-708.
- Greene, W. (1997). *Econometric analyses*. Upper Saddle River: Prentice-Hall.
- Greene, W. H. (2012). *NLOGIT Version 5, Reference Guide*, Econometric Software, Inc. Plainview, NY.
- Greene, W. H., & Hensher, D. A. (2010). Does scale heterogeneity across individuals matter? An empirical assessment of alternative logit models. *Transportation*, 37(3), 413-428.
- Grunert, K. G., Larsen, H. H., Madsen, T. K., & Baadsgaard, A. (1996). *Market orientation in food and agriculture*. Norwell, MA: Kluwer.
- Grunert, K. G., Juhl, H. J., & Poulsen, C. S. (2001). Perception de la qualité en alimentaire et rôle des labels. *Revue Française du Marketing –N°183/184*, 181-198.
- Grunert, K. G., Bredahl, L., & Brunsø, K. (2004). Consumer perception of meat quality and implications for product development in the meat sector—a review. *Meat Science*, 66(2), 259-272.
- Grunert, K. G. (2011). Sustainability in the food sector: A consumer behaviour perspective. *International Journal on Food System Dynamics*, 2(3), 207-218.
- Grunert, K. G., Loose, S. M., Zhou, Y., & Tinggaard, S. (2015). Extrinsic and intrinsic quality cues in Chinese consumers' purchase of pork ribs. *Food Quality and Preference*, 42, 37-47.
- General Statistics Office of Vietnam (GSO) (2015), *Statistical Yearbook of Vietnam*. [http://www.gso.gov.vn/default\\_en.aspx?tabid=515&idmid=5&ItemID=16052](http://www.gso.gov.vn/default_en.aspx?tabid=515&idmid=5&ItemID=16052) (accessed 10.09.17).
- Ha, N. T. V., Kitajima, M., Hang, N. V. M., Matsubara, K., Takizawa, S., Katayama, H., Oguma, K., & Ohgaki, S. (2008). Bacterial contamination of raw vegetables, vegetable-related water and river water in Ho Chi Minh City, Vietnam. *Water Science and Technology*, 58(12), 2403-2411.
- Haas, J. D., Beard, J. L., Murray-Kolb, L. E., del Mundo, A. M., Felix, A., & Gregorio, G. B. (2005). Iron-biofortified rice improves the iron stores of nonanemic Filipino women. *The Journal of Nutrition*, 135(12), 2823-2830.
- Hai, N. M., Moritaka, M., & Fukuda, S. (2013). Willingness to pay for organic vegetables in Vietnam: An empirical analysis in Hanoi capital. *Journal of the Faculty of Agriculture, Kyushu University*, 58(2), 449-458.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A Global Perspective* (7<sup>th</sup> ed., Global Edition). Edinburgh Gate, Harlow: Pearson Education Limited.
- Haghjou, M., Hayati, B., Pishbahar, E., Mohammadrezaei, R., & Dashti, G. (2013). Factors affecting consumers' potential willingness to pay for organic food products in Iran: Case study of Tabriz. *Journal of Agricultural Science and Technology*, 15(2), 191-202.
- Hamzaoui Essoussi, L., & Zahaf, M. (2009). Exploring the decision-making process of Canadian organic food consumers: Motivations and trust issues. *Qualitative Market Research: An International Journal*, 12(4), 443-459.



- Hanley, N., Wright, R. E., & Adamowicz, V. (1998). Using choice experiments to value the environment. *Environmental and Resource Economics*, 11(3), 413-428.
- Harding, J. S., Kutner, B., Proshansky, H. M., & Chein, I. (1954). Prejudice and ethnic relations. In: Lindzey, G. (Ed.), *Handbook of Social Psychology* (1st ed., Vol. II), Cambridge, MA: Addison-Wesley, pp. 1021–1061.
- Harter, S. (1983). Development perspectives on the self-system. In: Mussen, P.H. (Series Ed.) & Hetherington, E. M. (Volume Ed.), *Handbook of child psychology*, Vol. 4: *Socialization, personality and social development*, New York: Wiley, pp. 275-387.
- Hassan, L., Shaw, D., Shiu, E., Walsh, G., & Parry, S. (2013). Uncertainty in ethical consumer choice: A conceptual model. *Journal of Consumer Behaviour*, 12(3), 182-193.
- Hau, P. (2017). Organic products are not yet certified by Vietnam. <https://thanhnien.vn/doi-song/san-pham-huu-co-chua-duoc-vn-chung-nhan-822574.html> (In Vietnamese) (accessed 16.01.18).
- Hauge, M. M. (2016). Mind the GAP: Vietnamese rice farmers and distal markets. In Niewöhner, J., Bruns, A., Hostert, P., Krueger, T., Nielsen, J.Ø., Haberl, H., Lauk, C., Lutz, J., & Müller, D. (Eds.), *Land use competition: Ecological, economic and social perspectives*, Human-Environment Interactions 6, Springer International Publishing, Switzerland, pp. 75-89.
- Hefferon, K. L. (2015). Nutritionally enhanced food crops; progress and perspectives. *International Journal of Molecular Sciences*, 16(2), 3895-3914.
- Hensher, D. A., & Greene, W. H. (2003). The mixed logit model: The state of practice. *Transportation*, 30(2), 133-176.
- Hensher, D. A. (2010). Hypothetical bias, choice experiments and willingness to pay. *Transportation Research Part B: Methodological*, 44(6), 735-752.
- Hensher, D. A. (2012). Accounting for scale heterogeneity within and between pooled data sources. *Transportation Research Part A: Policy and Practice*, 46(3), 480-486.
- Hensher, D. A., Rose, J. M., & Greene, W. H. (2015). *Applied choice analysis* (2<sup>nd</sup> ed.). Cambridge University Press, Cambridge.
- Herrera, F. C., & Blanco, F. C. (2011). Consequences of consumer trust in PDO food products: The role of familiarity. *Journal of Product & Brand Management*, 20(4), 282-296.
- Hess, S., & Train, K. (2017). Correlation and scale in mixed logit models. *Journal of Choice Modelling*, 23, 1-8.
- Hess, S., & Rose, J. M. (2012). Can scale and coefficient heterogeneity be separated in random coefficients models?. *Transportation*, 39(6), 1225-1239.
- Hoang, H., & Meyers, W. (2015). Rice demand in Vietnam: Dietary changes and implications for policy. Selected paper prepared for presentation at the Southern Agricultural Economics Association's 2015 Annual Meeting (SAEA), Atlanta, Georgia, January 31 – February 3.
- Hoang, V. M., Tran, T. A., Ha, A. D., & Nguyen, V. H. (2015). Cost of hospitalization for foodborne diarrhea: A case study from Vietnam. *Journal of Korean Medical Science*, 30, S178-182.
- Hoai, P. M., Sebesvari, Z., Minh, T. B., Viet, P. H., & Renaud, F. G. (2011). Pesticide pollution in agricultural areas of Northern Vietnam: Case study in Hoang Liet and Minh Dai communes. *Environmental Pollution*, 159(12), 3344-3350.

- Hobbs, J. E., Fearne, A., & Spriggs, J. (2002). Incentive structures for food safety and quality assurance: An international comparison. *Food Control*, 13(2), 77-81.
- Hoe, D. V. (2005). Proceedings Asia regional workshop on the implementation, monitoring and observance of the international code of conduct on the distribution and use of pesticides. Report to FAO, (pp. 184-190). [http://coin.fao.org/coin-static/cms/media/9/13171779257290/2005\\_29.pdf](http://coin.fao.org/coin-static/cms/media/9/13171779257290/2005_29.pdf) (accessed 01.12.15).
- Hofenk, D., van Birgelen, M., Bloemer, J., & Semeijn, J. (2017). How and when retailers' sustainability efforts translate into positive consumer responses: The interplay between personal and social factors. *Journal of Business Ethics*, 1-20.
- Hoi, P. V., Mol, A., & Oosterveer, P. (2013). State governance of pesticide use and trade in Vietnam. *NJAS-Wageningen Journal of Life Sciences*, 67, 19-26.
- Hoi, P. V., Mol, A. P., Oosterveer, P., van den Brink, P. J., & Huong, P. T. (2016). Pesticide use in Vietnamese vegetable production: A 10-year study. *International Journal of Agricultural Sustainability*, 14(3), 325-338.
- Hong, A. (2016). Chinese chemicals flood Vietnam's agricultural sector. Vnexpress International. <http://e.vnexpress.net/news/news/chinese-chemicals-flood-vietnam-s-agricultural-sector-3472977.html> (accessed 08.03.17).
- Hossain, M. T. B., & Lim, P. X. (2016). Consumers' buying behaviour towards organic foods: Evidence from the emerging market. *Malaysian Management Review* 51(2), 7-25.
- Hou, M. A., Grazia, C., & Malorgio, G. (2015). Food safety standards and international supply chain organization: A case study of the Moroccan fruit and vegetable exports. *Food Control*, 55, 190-199.
- Hsu, S. Y., Chang, C. C., & Lin, T. T. (2016). An analysis of purchase intentions toward organic food on health consciousness and food safety with/under structural equation modelling. *British Food Journal*, 118(1), 200-216.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modelling: A Multidisciplinary Journal*, 6(1), 1-55.
- Hung, N. V., Tuyet-Hanh, T. T., Unger, F., Dang-Xuan, S., & Grace, D. (2017). Food safety in Vietnam: Where we are at and what we can learn from international experiences. *Infectious Diseases of Poverty*, 6(1), 39.
- Hung, Y., & Verbeke, W. (2018). Sensory attributes shaping consumers' willingness-to-pay for newly developed processed meat products with natural compounds and a reduced level of nitrite. *Food Quality and Preference* <https://doi.org/10.1016/j.foodqual.2017.02.017> (in press).
- Huong, B. T. M., Do, T. T., Madsen, H., Brimer, L., & Dalsgaard, A. (2016). Aflatoxins and fumonisins in rice and maize staple cereals in Northern Vietnam and dietary exposure in different ethnic groups. *Food Control*, 70, 191-200.
- Huong, L. Q., & Le Bas, C. (2008). In: Environmental, health and socio-economic: Risks associated with livestock intensification: Proceedings of the PRISE Scientific Committee, Hanoi, Vietnam, 4th December 2008. s.l.:s.n., pp. 57-64. [https://agritrop.cirad.fr/554322/1/document\\_554322.pdf](https://agritrop.cirad.fr/554322/1/document_554322.pdf) (accessed 30.08.17)
- Ibitoye, O. O., Nawi, N. M., Man, N., & Kamarulzaman, N. H. (2014). Factors influencing consumers' purchasing behaviour towards organic rice in Malaysia. *World Applied Sciences Journal*, 32(4), 611-617.

International Federation of Organic Agriculture Movements (IFOAM) (2005), Principles of organic agriculture, Bonn, Germany. [http://www.ifoam.bio/sites/default/files/poa\\_english\\_web.pdf](http://www.ifoam.bio/sites/default/files/poa_english_web.pdf) (accessed 30.08.16).

IFOAM (2012), Working for organic farming in Europe: Comment on US Interim Rule on fortification of organic products with vitamins and minerals. [http://www.ifoam-eu.org/sites/default/files/page/files/ifoameu\\_reg\\_usdanop\\_sunset\\_review\\_letter\\_20121219.pdf](http://www.ifoam-eu.org/sites/default/files/page/files/ifoameu_reg_usdanop_sunset_review_letter_20121219.pdf) (accessed 12.09.16).

Iop, S. C. F., Teixeira, E., & Deliza, R. (2006). Consumer research: Extrinsic variables in food studies. *British Food Journal*, 108(11), 894-903.

Jacoby, J., Troutman, T., Kuss, A., & Mazursky, D. (1986). Experience and expertise in complex decision making. *Advances in Consumer Research*, 13(1), 469-472.

Jacxsens, L., Van Boxtael, S., Nanyunja, J., Jordaan, D., Luning, P., & Uyttendaele, M. (2015). Opinions on fresh produce food safety and quality standards by fresh produce supply chain experts from the global South and North. *Journal of Food Protection*, 78(10), 1914-1924.

Jambunathan, S., Burts, D. C., & Pierce, S. H. (1999). Developmentally appropriate practices as predictors of self-competence among preschoolers. *Journal of Research in Childhood Education*, 13(2), 167-174.

Janssen, M., & Hamm, U. (2012). Product labelling in the market for organic food: Consumer preferences and willingness-to-pay for different organic certification logos. *Food Quality and Preference*, 25(1), 9-22.

Jeddi, N., & Zaiem, I. (2010). The impact of label perception on the consumer's purchase intention: An application on food products. *IBIMA Business Review*. <http://ibimapublishing.com/articles/IBIMABR/2010/476659/476659.pdf> (accessed 10.09.17).

Jia, C., & Jukes, D. (2013). The national food safety control system of China—a systematic review. *Food Control*, 32(1), 236-245.

Johnson, G. I., Weinberger, K., & Wu, M. H. (2008). The vegetable industry in Tropical Asia: An overview of production and trade, with a focus on Thailand, Indonesia, the Philippines, Vietnam, and India. Shanhua, Taiwan: AVRDC - The World Vegetable Center. 56p. (Exploration series; no.1; p. 11-12). [http://s3.amazonaws.com/zanran\\_storage/www.avrdc.org/ContentPages/17933346.pdf](http://s3.amazonaws.com/zanran_storage/www.avrdc.org/ContentPages/17933346.pdf) (accessed 20.12.15).

Kai, S. B., Chen, O. B., Chuan, C. S., Seong, L. C., & Kevin, L. L. T. (2013). Determinants of willingness to pay for organic products. *Middle-East Journal of Scientific Research*, 14(9), 1171-1179.

Kapuge, K. D. L. R. (2016). Determinants of organic food buying behaviour: Special reference to organic food purchase intention of Sri Lankan customers. *Procedia Food Science*, 6, 303-308.

Katz, D., & Stotland, E. (1959). A preliminary statement to a theory of attitude structure and change. In: Koch, S. (Ed.), *Psychology: A Study of a Science*, New York: McGraw-Hill, 1959, Vol. 3, pp. 423-475.

Kavoosi-Kalashami, M., & Heydari-Shalmani, M. (2014). Estimating Iranians consumers' WTP for Hashemi organic rice. *Journal of Agri-Food and Applied Sciences*, 2(10), 317-322.

Kearney, J. (2010). Review: Food consumption trends and drivers. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 365(1554), 2793-2807.

- Kelley, H. H. (1973). The processes of causal attribution. *American Psychologist*, 28(2), 107.
- Kimenju, S. C., De Groote, H., & Morawetz, U. B. (2006). Comparing accuracy and costs of revealed and stated preferences: The case of consumer acceptance of yellow maize in East Africa. Contributed paper prepared for presentation at the International Association of Agricultural Economists (IAAE), Gold Coast, Australia, <https://ageconsearch.umn.edu/bitstream/25642/1/cp061114.pdf> (accessed 26.01.18).
- Kim, M. K., & Lee, K. G. (2015). Influences of intrinsic and extrinsic factors on consumer acceptance of orange juice using consumer liking testing and Kano analysis techniques. *Food Science and Biotechnology*, 24(5), 1687-1693.
- Kirezieva, K., Nanyunja, J., Jacxsens, L., van der Vorst, J. G., Uyttendaele, M., & Luning, P. A. (2013). Context factors affecting design and operation of food safety management systems in the fresh produce chain. *Trends in Food Science & Technology*, 32(2), 108-127.
- Kirezieva, K., Luning, P. A., Jacxsens, L., Allende, A., Johannessen, G. S., Tondo, E. C., Rajkovic, A., Uyttendaele, M., & van Boekel, M. A. J. S. (2015). Factors affecting the status of food safety management systems in the global fresh produce chain. *Food Control*, 52, 85-97.
- Khan, S. N., & Mohsin, M. (2017). The power of emotional value: Exploring the effects of values on green product consumer choice behaviour. *Journal of Cleaner Production*, 150, 65-74.
- Khaosaeng, S., Netpradit, S., Ratchatanapun, R. & Tanprasert, K. (2012). Use of biodegradable blend for packaging of organic Hom Mali brown rice. In: Singh, J. (Ed.), Proceedings of the 18th International Association of Packaging Research Institute (IAPRI) World Packaging Conference, California Polytechnic State University: DEStech Publications, Inc, pp. 473-480.
- Khavul, S., & Bruton, G. D. (2013). Harnessing innovation for change: Sustainability and poverty in developing countries. *Journal of Management Studies*, 50(2), 285-306.
- Kline, P. (2013). *Handbook of psychological testing*. Routledge.
- Klotzbücher, T., Marxen, A., Vetterlein, D., Schneiker, J., Türke, M., Manh, N. H., Chien, H. V., Marquez, L., Villareal, S., Bustamante, J. V., & Jahn, R. (2015). Plant-available silicon in paddy soils as a key factor for sustainable rice production in Southeast Asia. *Basic and Applied Ecology*, 16(8), 665-673.
- Kormos, C., & Gifford, R. (2014). The validity of self-report measures of proenvironmental behaviour: A meta-analytic review. *Journal of Environmental Psychology*, 40, 359-371.
- Kongsom, W., & Kongsom, C. (2016). Consumer behaviour and knowledge on organic products in Thailand. *International Scholarly and Scientific Research and Innovation*, 10(8), 2534-2538.
- Kotler, P., Armstrong, G., Harris, L., & Piercy, N. F. (2013). *Principles of marketing*. European Edition, 6th Edition. Pearson education: Harlow.
- Kotsanopoulos, K. V., & Arvanitoyannis, I. S. (2017). The role of auditing, food safety, and food quality standards in the food industry: A review. *Comprehensive Reviews in Food Science and Food Safety*, 16(5), 760-775.
- Kouy, S., Sangkumchaliang, P., & Aditto, S. (2016). Consumers' attitude and intention to purchase organic goods in Cambodia. *International Journal of Business*, 21(4), 329-341.
- Krosnick, J. A., & Berent, M. K. (1993). Comparisons of party identification and policy preferences: The impact of survey question format. *American Journal of Political Science*, 37(3), 941-964.

- Krugman, H. E. (1966). Answering some unanswered questions in measuring advertising effectiveness. In: Proceedings, 12th Annual Meeting, Advertising Research Foundation, New York, pp. 18-23.
- Krystallis, A., & Chrysosoidis, G. (2005). Consumers' willingness to pay for organic food: Factors that affect it and variation per organic product type. *British Food Journal*, 107(5), 320-343.
- Kuminoff, N. V., & Wossink, A. (2010). Why isn't more US farmland organic?. *Journal of Agricultural Economics*, 61(2), 240-258.
- Kurunthachalam, S. K. (2017). Initiatives to build capacity in the area of food safety and analysis. *Medicinal Chemistry (Los Angeles)*, 7(8), e110.
- Lagerkvist, C. J., Hess, S., Okello, J., & Karanja, N. (2013). Consumer willingness to pay for safer vegetables in urban markets of a developing country: The case of Kale in Nairobi, Kenya. *The Journal of Development Studies*, 49(3), 365-382.
- Lailou, A., Berger, J., Le, B. M., Pham, V. T., Le, T. H., Nguyen, C. K., Panagides, D., Rohner, F., Wieringa, F., & Moench-Pfanner, R. (2012). Improvement of the Vietnamese diet for women of reproductive age by micronutrient fortification of staples foods and condiments. *Plos One*, 7(11), e50538.
- Lam, N. T. (2016). Potential of low-carbon development in Vietnam, from practices to legal framework. In: Nishioka, S. (Ed.), *Enabling Asia to Stabilise the Climate*, Springer Singapore, pp. 67-89.
- Lan, N. T. P. (2013). Social and ecological challenges of market-oriented shrimp farming in Vietnam. *SpringerPlus*, 2(1), 675.
- Lancaster, K. J. (1966). A new approach to consumer theory. *Journal of Political Economy*, 74(2), 132-157.
- Latiff, Z. A. B., Rezai, G., Mohamed, Z., & Amizi Ayob, M. (2016). Food labels' impact assessment on consumer purchasing behaviour in Malaysia. *Journal of Food Products Marketing*, 22(2), 137-146.
- Lavidge, R. J., & Steiner, G. A. (1961). A model for predictive measurements of advertising effectiveness. *Journal of Marketing*, 25(6), 59-62.
- Le, T. H. H., Nguyen, T. Q. H., Tran, C. S., Vu, T. T., Nguyen, T. L., Cao, V. H., Ta, T. T., Pham, T. N. M., Nguyen, T. A. H., & Mai, T. D. (2017). Screening determination of food additives using capillary electrophoresis coupled with contactless conductivity detection: A case study in Vietnam. *Food Control*, 77, 281-289.
- Le Bas, C., & Hanh, T. T. (2008). An introduction to food safety issues in Vietnam. In: Environmental, health and socio-economic: Risks associated with livestock intensification: Proceedings of the PRISE Scientific Committee, Hanoi, Vietnam, 4th December 2008. s.l.:s.n., pp. 24-36, [http://agritrop.cirad.fr/554320/1/document\\_554320.pdf](http://agritrop.cirad.fr/554320/1/document_554320.pdf) (accessed 30.08.17).
- Le Bas, C., Hanh, T. T., Thanh, N. T., Cuong, N. M., Quang, H. V., Binh, V. T., Minh, N. B., Gardon, C., Patin, A., Son, C-K., Mai, L. T., Labbe, A., Martine, D., & Fravallo, P. (2008). In: Environmental, health and socio-economic: Risks associated with livestock intensification: Proceedings of the PRISE Scientific Committee, Hanoi, Vietnam, 4th December 2008. s.l.:s.n., pp. 37-57. [http://agritrop.cirad.fr/554321/1/document\\_554321.pdf](http://agritrop.cirad.fr/554321/1/document_554321.pdf) (accessed 30.08.17).

- Lee, J. Y., Han, D. B., Nayga, R. M., & Lim, S. S. (2011). Valuing traceability of imported beef in Korea: An experimental auction approach. *Australian Journal of Agricultural and Resource Economics*, 55(3), 360-373.
- Lee, J., Gereffi, G., & Beauvais, J. (2012). Global value chains and agrifood standards: Challenges and possibilities for smallholders in developing countries. *Proceedings of the National Academy of Sciences*, 109(31), 12326-12331.
- Lee, J. Y., Han, D. B., Nayga Jr, R. M., & Yoon, J. M. (2014). Assessing Korean consumers' valuation for domestic, Chinese, and US rice: Importance of country of origin and food miles information. *China Agricultural Economic Review*, 6(1), 125-138.
- Lee, H. J., & Yun, Z. S. (2015). Consumers' perceptions of organic food attributes and cognitive and affective attitudes as determinants of their purchase intentions toward organic food. *Food Quality and Preference*, 39, 259-267.
- Lee, H. J., & Hwang, J. (2016). The driving role of consumers' perceived credence attributes in organic food purchase decisions: A comparison of two groups of consumers. *Food Quality and Preference*, 54, 141-151.
- Lehtinen, U. (2017). Sustainable supply chain management in agri-food chains: A competitive factor for food exporters. In: R. Bhat (Ed.), *Sustainability challenges in the agrofood sector*, Chichester, UK: John Wiley & Sons Ltd, pp. 150-174.
- Liem, L. T. (1995). Chinh sach cai cach ruong dat Vietnam (1954–1994) [Land Reform Policies in Vietnam (1954–1994)]. *Nam A, Paris*, Vol. 100.
- Liu, R., Pieniak, Z., & Verbeke, W. (2013). Consumers' attitudes and behaviour towards safe food in China: A review. *Food Control*, 33(1), 93-104.
- Lusk, J. L., & Schroeder, T. C. (2004). Are choice experiments incentive compatible? A test with quality differentiated beef steaks. *American Journal of Agricultural Economics*, 86(2), 467-482.
- Lusk, J. L., Feldkamp, T., & Schroeder, T. C. (2004). Experimental auction procedure: Impact on valuation of quality differentiated goods. *American Journal of Agricultural Economics*, 86(2), 389-405.
- Lusk, J. L., & Shogren, J. F. (2007). *Experimental auctions: Methods and applications in economic and marketing research*. Cambridge, UK: Cambridge University Press.
- Lütteken, A., & Hagedorn, K. (1999). Concepts and issues of sustainability in countries in transition – An institutional concept of sustainability as a basis for the network. <http://www.fao.org/docrep/006/AD238E/ad238e08.htm> (accessed 30.08.17).
- Mangham, L. J., Hanson, K., & McPake, B. (2009). How to do (or not to do)... Designing a discrete choice experiment for application in a low-income country. *Health Policy and Planning*, 24(2), 151-158.
- Magnusson, M. K., Arvola, A., Hursti, U. K. K., Åberg, L., & Sjöden, P. O. (2003). Choice of organic foods is related to perceived consequences for human health and to environmentally friendly behaviour. *Appetite*, 40(2), 109-117.
- Manaloor, V., Srivastava, D., & Islam, S. (2016). Growth of organic food industry in India. *AGROFOR International Journal* 1(2), 69-76.
- Maruyama, M., & Wu, L. (2014). Quantifying barriers impeding the diffusion of supermarkets in China: The role of shopping habits. *Journal of Retailing and Consumer Services*, 21(3), 383-393.

- McFadden, D. (1974). Conditional logit analysis of qualitative choice behaviour. In: Zarembka, P. (Ed.), *Frontiers in econometrics*, Academic Press, New York, pp. 105-142.
- McFadden, J. R., & Huffman, W. E. (2017). Willingness-to-pay for natural, organic, and conventional foods: The effects of information and meaningful labels. *Food Policy*, 68, 214-232.
- Menozzi, D., Halawany-Darson, R., Mora, C., & Giraud, G. (2015). Motives towards traceable food choice: A comparison between French and Italian consumers. *Food Control*, 49, 40-48.
- Mergenthaler, M., Weinberger, K., & Qaim, M. (2009). Consumer valuation of food quality and food safety attributes in Vietnam. *Review of Agricultural Economics*, 31(2), 266-283.
- Meyer, S. B., Coveney, J., Henderson, J., Ward, P. R., & Taylor, A. W. (2012). Reconnecting Australian consumers and producers: Identifying problems of distrust. *Food Policy*, 37(6), 634-640.
- Michaelidou, N., & Hassan, L. M. (2008). The role of health consciousness, food safety concern and ethical identity on attitudes and intentions towards organic food. *International Journal of Consumer Studies*, 32(2), 163-170.
- Ministry of Agricultural and Rural Development of Vietnam (MARD) (2006), Organic - Standard for organic agricultural Production and Processing: 10TCN 602-2006.
- MARD (2008a), VietGAP: Good Agricultural Practices for production of fresh fruit and vegetables in Vietnam. [https://www.unido.org/fileadmin/user\\_media/News/2008/VIETGAP-Fruit\\_and\\_Vegetables-English.pdf](https://www.unido.org/fileadmin/user_media/News/2008/VIETGAP-Fruit_and_Vegetables-English.pdf) (accessed 04.02.17).
- MARD (2008b), Decision on issuing the guidelines for good agricultural practices (VietGAP) for vegetables and fruit: 379/QĐ-BNN-KHCN.
- MARD (2010), Decision on issuing the guidelines for good agricultural practices (VietGAP) for rice: 2998/QĐ-BNN-TT.
- MARD (2016), Decision on the action plan of the year on food safety in agriculture: 629/QĐ-BNN-QLCL, Hanoi, 2016.
- Ministry of Science and Technology (MOST) (2015), Guidelines for the production, processing, labelling and marketing of organically produced foods: TCVN 11041:2015.
- Mondelaers, K., Verbeke, W., & Van Huylenbroeck, G. (2009). Importance of health and environment as quality traits in the buying decision of organic products. *British Food Journal*, 111(10), 1120-1139.
- Moser, R., & Raffaelli, R. (2012). Consumer preferences for sustainable production methods in apple purchasing behaviour: A non-hypothetical choice experiment. *International Journal of Consumer Studies*, 36(2), 141-148.
- Morrison, M., Bennett, J., Blamey, R., & Louviere, J. (2002). Choice modelling and tests of benefit transfer. *American Journal of Agricultural Economics*, 84(1), 161-170.
- Mowen, J. C., & Minor, M. (2001). *Consumer behaviour: A framework*. USA: Prentice Hall.
- Mullinix, K. J., Leeper, T. J., Druckman, J. N., & Freese, J. (2015). The generalizability of survey experiments. *Journal of Experimental Political Science*, 2(2), 109-138.
- 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.

- Nanyunja, J., Jacxsens, L., Kirezicva, K., Kaaya, A. N., Uyttendaele, M., & Luning, P. A. (2016). Shift in performance of food safety management systems in supply chains: Case of green bean chain in Kenya versus hot pepper chain in Uganda. *Journal of the Science of Food and Agriculture*, 96(10), 3380-3392.
- National Congress of the Communist Party of Vietnam (2012), The “Law on Price”: 11/2012/QH13. [http://vanban.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class\\_id=1&mode=detail&document\\_id=163069](http://vanban.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_id=1&mode=detail&document_id=163069) (in Vietnamese) (accessed 28.01.18).
- Nelson, P. (1974). Advertising as information. *Journal of Political Economy*, 82(4), 729-754.
- Nguyen, M. T., Tozlovanu, M., Tran, T. L., & Pfohl-Leszkowicz, A. (2007). Occurrence of aflatoxin B1, citrinin and ochratoxin A in rice in five provinces of the central region of Vietnam. *Food chemistry*, 105(1), 42-47.
- Nhien, T. (2014). Vietnamese farmers’ overuse of pesticide harms fertile soil. VietNamNet Bridge. <http://english.vietnamnet.vn/fms/environment/119375/vietnamese-farmers--overuse-of-pesticide-harms-fertile-soil.html> (accessed 22.03.17).
- Nielsen, C. P. (2003). Vietnam's rice policy: Recent reforms and future opportunities. *Asian Economic Journal*, 17(1), 1-26.
- Nougadère, A., Merlo, M., Héraud, F., Réty, J., Truchot, E., Vial, G., Cravedi, J-P., & Leblanc, J-C. (2014). How dietary risk assessment can guide risk management and food monitoring programmes: The approach and results of the French Observatory on Pesticide Residues (ANSES/ORP). *Food Control*, 41, 32-48.
- Noussair, C., Robin, S., & Ruffieux, B. (2002). Do consumers not care about biotech foods or do they just not read the labels?. *Economics Letters*, 75(1), 47-53.
- Noussair, C., Robin, S., & Ruffieux, B. (2004). Revealing consumers' willingness-to-pay: A comparison of the BDM mechanism and the Vickrey auction. *Journal of Economic Psychology*, 25(6), 725-741.
- Nuttavuthisit, K., & Thøgersen, J. (2017). The importance of consumer trust for the emergence of a market for green products: The case of organic food. *Journal of Business Ethics*, 140(2), 323-337.
- Olson, J., & Jacoby, J. (1972). Cue utilization in the quality perception process. In: Venkatesan, M. (Ed.), *Proceedings of the Third Annual Conference of the Association for Consumer Research*, Association for Consumer Research, Chicago, IL, pp. 167-79.
- Olsen, S. O., Scholderer, J., Brunsø, K., & Verbeke, W. (2007). Exploring the relationship between convenience and fish consumption: A cross-cultural study. *Appetite*, 49(1), 84-91.
- Ortega, D. L., & Tschirley, D. L. (2017). Demand for food safety in emerging and developing countries: A research agenda for Asia and Sub-Saharan Africa. *Journal of Agribusiness in Developing and Emerging Economies*, 7(1), 21-34.
- Ostrom, T. M. (1969). The relationship between the affective, behavioural, and cognitive components of attitude. *Journal of Experimental Social Psychology*, 5(1), 12-30.
- Oxford Committee for Famine Relief (OXFAM) (2015), Harmless harvest: How sustainable agriculture can help ASEAN countries adapt to a changing climate. <http://oxfamlibrary.openrepository.com/oxfam/bitstream/10546/556778/1/bp-harmless-harvest-sustainable-agriculture-asean-250515-en.pdf> (accessed 20.08.17).



- Pearce, D., Özdemiroglu, E., et al. (2002). Economic valuation with stated preference techniques: Summary guide. London: Department for Transport, Local Government and the Regions.  
<http://webarchive.nationalarchives.gov.uk/20120919162306/http://www.communities.gov.uk/documents/corporate/pdf/146871.pdf> (accessed 26.01.18).
- Peterson, H. H., Bernard, J. C., Fox, J. A., & Peterson, J. M. (2013). Japanese consumers' valuation of rice and pork from domestic, US, and other origins. *Journal of Agricultural and Resource Economics*, 93-106.
- Pickles, J., Barrientos, S., & Knorrinda, P. (2016). New end markets, supermarket expansion and shifting social standards. *Environment and Planning A*, 48(7), 1284-1301.
- Pieniak, Z., Verbeke, W., Scholderer, J., Brunsø, K., & Olsen, S.O. (2008). Impact of consumers' health beliefs, health involvement and risk perception on fish consumption: A study in five European countries. *British Food Journal*, 110(9), 898-915.
- Pieniak, Z., Aertsens, J., & Verbeke, W. (2010). Subjective and objective knowledge as determinants of organic vegetables consumption. *Food Quality and Preference*, 21(6), 581-588.
- Pomsanam, P., Napompech, K., & Suwanmaneepong, S. (2014). Factors driving Thai consumers' intention to purchase organic foods. *Asian Journal of Scientific Research*, 7(4), 434-446.
- QUACERT (National Certification Centre of Vietnam) (2016), <http://www.quacert.gov.vn/en/crops.iso268.html> (accessed 20.01.16).
- Quan, D. (2015). Contaminated plastic rice originated from China threatened Asia consumers. <https://thanhnien.vn/the-gioi/gao-nhua-doc-hai-tu-trung-quoc-de-doa-nguoi-dan-chau-a-564137.html> (In Vietnamese). (Accessed 24.01.18).
- Ray, M. L., Sawyer, A. G., Rothschild, M. L., Heeler, R. M., Strong, E. C., & Reed, J. B. (1973). Marketing communication and the hierarchy-of-effects. In: Clarke, P. (Ed.), *New models for mass communication research*, Beverly Sage, CA: Publishing, pp. 147-176.
- Reardon, T., Timmer, C. P., & Minten, B. (2012). Supermarket revolution in Asia and emerging development strategies to include small farmers. *Proceedings of the National Academy of Sciences*, 109(31), 12332-12337.
- Reisch, L., Eberle, U., & Lorek, S. (2013). Sustainable food consumption: An overview of contemporary issues and policies. *Sustainability: Science, Practice, & Policy*, 9(2), 7-25.
- Revell, B. J. (2016). Urban consumer attitudes to fresh produce safety in China. *Journal of Food Science and Engineering*, 6, 1-10.
- Rodríguez, E., Lacaze, V., & Lupín, B. (2009). Willingness to pay for organic food in Argentina: Evidence from a consumer survey. In: Canavari, M., Cantore, N., Castellini, A., Pignatti, E., & Spadoni, R. (Eds.), *International marketing and trade of quality food products*. Wageningen, The Netherlands: Wageningen Academic Publishers, pp. 297-314.
- Roitner-Schobesberger, B., Darnhofer, I., Somsook, S., & Vogl, C. R. (2008). Consumer perceptions of organic foods in Bangkok, Thailand. *Food Policy*, 33(2), 112-121.
- Rosenberg, M. J., & Hovland, C. I. (1960). Cognitive, affective and behavioural components of attitudes. In: Rosenberg, M. J., Hovland, C. I. (Eds.), *Attitude organization and change: An analysis of consistency among attitude components*, Yale University Press, New Haven.

- Rousseau, S. (2015). The role of organic and fair trade labels when choosing chocolate. *Food Quality and Preference*, 44, 92-100.
- Rousseau, S., & Vranken, L. (2013). Green market expansion by reducing information asymmetries: Evidence for labelled organic food products. *Food Policy*, 40, 31-43.
- Sakar, S., Sharma, D., & Kalro, A. D. (2015). The effect of naming strategy and packaging on perceived quality and purchase intention of private label brands. In: Martínez-López, F. J., Gázquez-Abad, J. C., & Sethuraman, R. (Eds.), *Advances in national brand and private label marketing*, Springer International Publishing Switzerland, pp. 103-111.
- Salleh, M. M., Ali, S. M., Harun, E. H., Jalil, M. A., & Shaharudin, M. R. (2010). Consumer's perception and purchase intentions towards organic food products: Exploring attitude among academicians. *Canadian Social Science*, 6(6), 119-129.
- Samapundo, S., Thanh, T. C., Xhaferi, R., & Devlieghere, F. (2016). Food safety knowledge, attitudes and practices of street food vendors and consumers in Ho Chi Minh city, Vietnam. *Food Control*, 70, 79-89.
- Sarter, S., Ho, P. H., & To, K. A. (2014). Current context of food safety in Vietnam: A glance at food of animal origin. Special issue: *Food safety in Asia*. Wageningen Academic Publishers.
- Sarter, S., Ho, P. H., & To, K. A. (2012). Current situation of food safety in Vietnam. Presentation at the 1<sup>st</sup> FOODSEG Symposium, Berlin, Germany, 21-22 June 2012. [http://foodseg.linux15.webhome.at/fileadmin/userdaten/pres\\_symp\\_I/presentations\\_pdf/vietnam.pdf](http://foodseg.linux15.webhome.at/fileadmin/userdaten/pres_symp_I/presentations_pdf/vietnam.pdf) (accessed 24.08.17).
- Saunders, C., Guenther, M., Tait, P., & Saunders, J. (2013). Consumer attitudes and willingness to pay for attributes of food, in particular from New Zealand. Proceedings of the 57th AARES Annual Conference, Sydney, 5-8 February, 2013. Canberra, Australia: Australian Agricultural and Resource Economics Society.
- Schiffman, L. G., & Kanuk, L. L. (2007). *Consumer Behaviour* (9<sup>th</sup> ed.). New Jersey: Pearson Education, Prentice Hall.
- Schmidt-Thomé, P., Nguyen, T. H., Pham, T. L., Jarva, J., & Nuottimäki, K. (2015). Climate change in Vietnam. In: Schmidt-Thomé, P., Nguyen, T. H., Pham, T. L., Jarva, J., & Nuottimäki, K. (Eds.), *Climate change adaptation measures in Vietnam: Development and implementation*, Springer Briefs in Earth Sciences, Springer International Publishing, pp. 7-15.
- Schnettler, B., Ruiz, D., Sepúlveda, O., & Sepúlveda, N. (2008). Importance of the country of origin in food consumption in a developing country. *Food Quality and Preference*, 19(4), 372-382.
- Sebesvari, Z., Le, T. T. H., & Renaud, F. G. (2011). Climate change adaptation and agrichemicals in the Mekong Delta, Vietnam. In: Stewart, M. A., Coclanis, P. A. (Eds.), *Environmental change and agricultural sustainability in the Mekong Delta*. Advances in Global Change Research 45. Springer, Dordrecht, Netherlands, pp. 219-239.
- Seetisarn, P., & Chiaravutthi, Y. (2011). Thai consumers willingness to pay for food products with geographical indications. *International Business Research*, 4(3), 161-169.
- Sekovska, B., Branislav, V., & Bunevski, G. (2013). Consumption of organic food in Macedonia and Serbia: Similarities and differences. In: Klopčič, M., Kuipers, A., & Hocquette, J-F. (Eds.), *Consumer attitudes to food quality products*, EAAP Publication 133, Wageningen, The Netherlands: Wageningen Academic Publishers, pp. 239-245.

- Setiyawati, S., Haryanto, B., & Haryono, T. (2016). Whose choice is it? The role of attitude in determining customer's intention to use the courier. *Asian Social Science* 12(12), 229-245.
- Shibin, K. T., Gunasekaran, A., Papadopoulos, T., Dubey, R., & Mishra, D. (2016). Sustainable consumption and production: Need, challenges and further research directions. *International Journal of Process Management and Benchmarking*, 6(4), 447-468.
- Shrestha, S., Deb, P., & Bui, T. T. T. (2016). Adaptation strategies for rice cultivation under climate change in Central Vietnam. *Mitigation and Adaptation Strategies for Global Change*, 21(1), 15-37.
- Sichtmann, C., & Stingel, S. (2007). Limit conjoint analysis and Vickrey auction as methods to elicit consumers' willingness-to-pay: An empirical comparison. *European Journal of Marketing*, 41 (11/12), 1359-1374.
- Silva, A., Nayga Jr, R. M., Campbell, B. L., & Park, J. L. (2011). Revisiting cheap talk with new evidence from a field experiment. *Journal of Agricultural and Resource Economics*, 280-291.
- Singla, M. (2010). Usage and understanding of food and nutritional labels among Indian consumers. *British Food Journal*, 112(1), 83-92.
- Sirieix, L., Kledal, P. R., & Sulitang, T. (2011). Organic food consumers' trade-offs between local or imported, conventional or organic products: A qualitative study in Shanghai. *International Journal of Consumer Studies*, 35(6), 670-678.
- Sitkova, S. (2015). Vegetable consumption skyrocketed in Vietnam. <http://www.indexbox.co.uk/news/Vegetable-Consumption-Skyrocketed-In-Viet-Nam/> (accessed 06.12.15).
- Slamet, A. S., Nakayasu, A., & Bai, H. (2016). The determinants of organic vegetable purchasing in Jabodetabek region, Indonesia. *Foods*, 5(4), 85, foods5040085, 1-18.
- Smajgl, A., Toan, T. Q., Nhan, D. K., Ward, J., Trung, N. H., Tri, L. Q., Tri, V. P. D., & Vu, P. T. (2015). Responding to rising sea levels in the Mekong Delta. *Nature Climate Change*, 5(2), 167-174.
- Smith, S., & Paladino, A. (2010). Eating clean and green? Investigating consumer motivations towards the purchase of organic food. *Australasian Marketing Journal*, 18(2), 93-104.
- Somasundram, C., Razali, Z., & Santhirasegaram, V. (2016). A review on organic food production in Malaysia. *Horticulturae*, 2(3), 12, horticulturae2030012, 1-5.
- Son, D. K., Que, N. N., Dieu, P. Q., Trang, T. T. T., & Beresford, M. (2006). Policy reform and the transformation of Vietnamese agriculture. In: Rapid growth of selected Asia economies, Lessons and implications for agriculture and food security Republic Korea, Thailand and Vietnam. Bangkok, FAO, 2006. <http://www.fao.org/docrep/009/ag089e/AG089E09.htm> (accessed 06.09.17).
- Sonntag, W., Theuvsen, L., Kersting, V., & Otter, V. (2016). Have industrialized countries shut the door and left the key inside? Rethinking the role of private standards in the international fruit trade. *International Food and Agribusiness Management Review*, 19(2), 151-170.
- Sriwaranun, Y., Gan, C., Lee, M., & Cohen, D. A. (2015). Consumers' willingness to pay for organic products in Thailand. *International Journal of Social Economics*, 42(5), 480-510.
- StataCorp. (2013). *Stata statistical software: Release 13*. College station, Texas: StataCorp LP.

- Statista (2017), Principal rice exporting countries worldwide in 2016/2017. <https://www.statista.com/statistics/255947/top-rice-exporting-countries-worldwide-2011/> (accessed 06.09.17).
- Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The food choice questionnaire. *Appetite*, 25(3), 267-284.
- Sustainable Rice Platform (SRP) (2017), <http://www.sustainableice.org/> (accessed 08.06.17).
- Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4<sup>th</sup> ed.). Massachusetts: Allyn & Bacon.
- Tait, P., Saunders, C., Guenther, M., & Rutherford, P. (2016). Emerging versus developed economy consumer willingness to pay for environmentally sustainable food production: A choice experiment approach comparing Indian, Chinese and United Kingdom lamb consumers. *Journal of Cleaner Production*, 124, 65-72.
- Takemoto, M., Boissière, L., Vital, J. M., Pellisé, F., Perez-Gruoso, F. J. S., Kleinstück, F., Acaroglu, E. R., Alanay, A., & Obeid, I. (2017). Are sagittal spinopelvic radiographic parameters significantly associated with quality of life of adult spinal deformity patients? Multivariate linear regression analyses for pre-operative and short-term post-operative health-related quality of life. *European Spine Journal*, 26(8), 2176-2186.
- Tam, B. T. (2016). It is Vietnamese killing each other. Dantri International <http://dtinews.vn/en/news/027/44606/it-is-vietnamese-killing-each-other.html> (accessed 22.03.17).
- Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research*, 6(2), 144-176.
- Tegene, A., Huffman, W. E., Rousu, M., & Shogren, J. F. (2003). The effects of information on consumer demand for biotech foods: Evidence from experimental auctions (No. 184323). United States Department of Agriculture, Economic Research Service.
- Teng, C. C., & Lu, C. H. (2016). Organic food consumption in Taiwan: Motives, involvement, and purchase intention under the moderating role of uncertainty. *Appetite*, 105, 95-105.
- Teng, P. K., Rezai, G., Mohamed, Z., & Shamsudin, M. N. (2011). Consumers' intention to purchase green foods in Malaysia. In: International conference on innovation, management and service, Vol. 14, pp. 112-118, Singapore. <http://www.ipedr.com/vol14/21-ICIMS2011S00035.pdf> (accessed 10.09.17).
- Tey, Y. S., Arsil, P., Brindal, M., Shamsudin, M. N., Radam, A., Hadi, A. H. I. A., Rajendran, N., & Lim, C. D. (2015). A means-end chain approach to explaining the adoption of good agricultural practices certification schemes: The case of Malaysian vegetable farmers. *Journal of Agricultural and Environmental Ethics*, 28(5), 977-990.
- Thang, T. C. (2012). Natural resources and infrastructure management for agriculture and food security in Vietnam. Presentation at: APEC International Conference, Bangkok, Thailand, August 2012. <http://www.oae.go.th/biae/download/Natural%20Resources%20and%20Infrastructure%20Management%20for%20Agriculture.ppt>. (accessed 22.01.18).
- Thanh, P. C., Tan, V. P., & Thu, P. X. (2017). Enhancing the value chain of exporting agricultural products in the South-eastern Vietnam focus economic region – SOFER. *Universal Journal of Management* 5(1), 1-13.

- Thøgersen, J., Zhou, Y., & Huang, G. (2016). How stable is the value basis for organic food consumption in China?. *Journal of Cleaner Production*, 134, 214-224.
- Thong, N. T., Nguyen, D. H., Bich, P. T. N., & Huong, L. T. M. (2017). Sustainable consumption and production in Vietnam. In: Schroeder, P., Anggraeni, K., Sartori, S., & Weber, U. (Eds.), *Sustainable Asia: Supporting the transition to sustainable consumption and production in Asian developing countries*, pp. 327-356.
- Thurstone, L. L. (1987). Psychological analysis. *The American Journal of Psychology*, Vol. 100 No. (3-4), pp. 587-609.
- Tilman, D., Cassman, K. G., Matson, P. A., Naylor, R., & Polasky, S. (2002). Agricultural sustainability and intensive production practices. *Nature*, 418(6898), 671-677.
- Train, K. (2000). Halton sequences for mixed logit. Economics Working Papers E00-278, University of California at Berkeley.
- Train, K. E. (2009). *Discrete choice methods with simulation*. Cambridge University Press, New York, NY.
- Trumbo, C. W., & McComas, K. A. (2003). The function of credibility in information processing for risk perception. *Risk Analysis*, 23(2), 343-353.
- Tsakiridou, E., Boutsouki, C., Zotos, Y., & Mattas, K. (2008). Attitudes and behaviour towards organic products: An exploratory study. *International Journal of Retail & Distribution Management*, 36(2), 158-175.
- Ubilava, D., & Foster, K. (2009). Quality certification vs. product traceability: Consumer preferences for informational attributes of pork in Georgia. *Food Policy*, 34(3), 305-310.
- United Nations (UN) (2015), Sustainable Development Goals. <http://www.un.org/sustainabledevelopment/sustainable-development-goals> (accessed 20.04.17).
- UN (2016), Vietnam consolidated report on drought and saltwater intrusion – Reporting period Oct 2015 – Mar 2016. [https://reliefweb.int/sites/reliefweb.int/files/resources/Vietnam%20Consolidated%20Report%20on%20Drought%202015-2016-Final\\_11%20Mar%202016.pdf](https://reliefweb.int/sites/reliefweb.int/files/resources/Vietnam%20Consolidated%20Report%20on%20Drought%202015-2016-Final_11%20Mar%202016.pdf) (accessed 20.09.17).
- United States Environmental Protection Agency (US-EPA) (2011), Integrated Pest Management (IPM) Principles. Last updated on February 16, 2011. [http://ucbiotech.org/biotech\\_info/PDFs/EPA\\_2008\\_Integrated\\_Pest\\_Management\\_IPM\\_Principles.pdf](http://ucbiotech.org/biotech_info/PDFs/EPA_2008_Integrated_Pest_Management_IPM_Principles.pdf) (accessed 20.02.15).
- United States Department of Agriculture Foreign Agricultural Service (USDA) (2014), Hong Kong's rice market. [https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Hong%20Kong%E2%80%99s%20Rice%20Market\\_Hong%20Kong\\_Hong%20Kong\\_4-17-2014.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Hong%20Kong%E2%80%99s%20Rice%20Market_Hong%20Kong_Hong%20Kong_4-17-2014.pdf) (accessed 18.10.17).
- Unnevehr, L. (Ed.). (2003). *Food safety in food security and food trade* (Vol. 10). Washington, DC: International Food Policy Research Institute.
- Unnevehr, L. (2015). Food safety in developing countries: Moving beyond exports. *Global Food Security*, 4, 24-29.
- Uyttendaele, M., Franz, E., & Schluter, O. (2016). Food safety, a global challenge. *International Journal of Environmental Research and Public Health*, 13(67), 1-6.

- Valin, H., Havlik, P., Mosnier, A., Herrero, M., Schmid, E., & Obersteiner, M. (2013). Agricultural productivity and greenhouse gas emissions: Trade-offs or synergies between mitigation and food security?. *Environmental Research Letters*, 8(3), 035019, 1-9.
- Van Boxstael, S., Habib, I., Jacxsens, L., De Vocht, M., Baert, L., Van de Perre, E., Rajkovic, A., Lopez-Galvez, F., Sampers, I., Spanoghe, P., De Meulenaer, B., & Uyttendaele, M. (2013). Food safety issues in fresh produce: Bacterial pathogens, viruses and pesticide residues indicated as major concerns by stakeholders in the fresh produce chain. *Food Control*, 32(1), 190-197.
- Vandeplas, A., & Minten, B. (2015). Food quality in domestic markets of developing economies: A comparative study of two countries. *Agricultural Economics*, 46(5), 617-628.
- Van Loo, E. J., My, N. H. D., Pieniak, Z., & Verbeke, W. (2013). Consumer attitudes, knowledge, and consumption of organic yogurt. *Journal of Dairy Science*, 96(4), 2118-2129.
- Van Loo, E. J., Caputo, V., Nayga, R. M., & Verbeke, W. (2014). Consumers' valuation of sustainability labels on meat. *Food Policy*, 49, 137-150.
- Van Loo, E. J., Caputo, V., Nayga, R. M., Seo, H. S., Zhang, B., & Verbeke, W. (2015). Sustainability labels on coffee: Consumer preferences, willingness-to-pay and visual attention to attributes. *Ecological Economics*, 118, 215-225.
- Van Loo, E. J., Hoefkens, C., & Verbeke, W. (2017). Healthy, sustainable and plant-based eating: Perceived (mis) match and involvement-based consumer segments as targets for future policy. *Food Policy*, 69, 46-57.
- Verbeke, W. (1999). Factors influencing the consumer decision-making process toward meat. PhD Thesis.
- Verbeke, W. (2005). Agriculture and the food industry in the information age. *European Review of Agricultural Economics*, 32(3), 347-368.
- Vermeir, I., & Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. *Ecological Economics*, 64(3), 542-553.
- Verbeke, W. (2015). Profiling consumers who are ready to adopt insects as a meat substitute in a Western society. *Food Quality and Preference*, 39, 147-155.
- Vernekar, S. S., & Wadhwa, P. (2011). Green consumption: An empirical study of consumers attitudes and perception regarding eco-friendly FMCG products, with special reference to Delhi and NCR region. *Opinion*, 1(1), 64-74.
- VgpNews (The Socialist Republic of Vietnam, Online Newspaper of the Government) (2017a), Conference on Sustainable and Climate-resilient Development for the Mekong Delta. <http://news.chinhphu.vn/Home/Conference-on-Sustainable-and-Climateresilient-Development-for-Mekong-Delta/20179/31820.vgp> (accessed 20.10.17).
- VgpNews (2017b), PM to chair conference on sustainable development in Mekong Delta. <http://news.chinhphu.vn/Home/PM-to-chair-conference-on-sustainable-development-in-Mekong-Delta/20179/31630.vgp> (accessed 20.10.17).
- Vidogbéna, F., Adégbidi, A., Tossou, R., Assogba-Komlan, F., Martin, T., Ngouajio, M., Simon, S., Parrot, L. & Zander, K. K. (2015). Consumers' willingness to pay for cabbage with minimized pesticide residues in Southern Benin. *Environments*, 2(4), 449-470.
- Vietnam Food Administration(VFA) (2000-2012), Food poisoning statistics. <http://vfa.gov.vn> (accessed 10.09.17).

- VietnamNews (2015), Food poisoning hits factory cafeterias. <http://vietnamnews.vn/society/277704/food-poisoning-hits-factory-cafeterias.html#3sSeCtYtVL6TRLhL.97> (accessed 08.03.17).
- VietnamNews (2017), Mekong Delta prepares for large-scale transformation to ensure future. <http://vietnamnews.vn/society/394536/mekong-delta-prepares-for-large-scale-transformation-to-ensure-future.html#GjakP6xzWbVjwmGx.97> (accessed 20.10.17).
- Vietnam Business Forum (2016), Hong Kong – Potential for Vietnamese Businesses. [http://vccinews.com/news\\_detail.asp?news\\_id=33927](http://vccinews.com/news_detail.asp?news_id=33927) (accessed 18.10.17).
- Vietnam Trade Promotion Agency - Export Promotion Center (2008), Report on Vietnamese rice sector. ASEAN-KOREA. [https://www.aseankorea.org/aseanZone/downloadFile2.asp?boa\\_filenum=1595](https://www.aseankorea.org/aseanZone/downloadFile2.asp?boa_filenum=1595) (accessed 20.02.17).
- Voelckner, F. (2006). An empirical comparison of methods for measuring consumers' willingness to pay. *Marketing Letters*, 17(2), 137-149.
- Voon, J. P., Ngui, K. S., & Agrawal, A. (2011). Determinants of willingness to purchase organic food: An exploratory study using structural equation modelling. *International Food and Agribusiness Management Review*, 14(2), 103-120.
- Wang, H., Moustier, P., & Loc, N. T. T. (2014). Economic impact of direct marketing and contracts: The case of safe vegetable chains in northern Vietnam. *Food Policy*, 47, 13-23.
- Wee, C. S., Ariff, M. S. B. M., Zakuan, N., Tajudin, M. N. M., Ismail, K., & Ishak, N. (2014). Consumers perception, purchase intention and actual purchase behaviour of organic food products. *Review of Integrative Business and Economics Research*, 3(2), 378-397.
- Wertenbroch, K., & Skiera, B. (2002). Measuring consumers' willingness to pay at the point of purchase. *Journal of Marketing Research*, 39(2), 228-241.
- Wertheim-Heck, S. C., Spaargaren, G., & Vellema, S. (2014). Food safety in everyday life: Shopping for vegetables in a rural city in Vietnam. *Journal of Rural Studies*, 35, 37-48.
- Wertheim-Heck, S. C., Vellema, S., & Spaargaren, G. (2015). Food safety and urban food markets in Vietnam: The need for flexible and customized retail modernization policies. *Food Policy*, 54, 95-106.
- Wertheim-Heck, S. C., & Spaargaren, G. (2016). Shifting configurations of shopping practices and food safety dynamics in Hanoi, Vietnam: A historical analysis. *Agriculture and Human Values*, 33(3), 655-671.
- West, D., Ford, J., & Ibrahim, E. (2015). *Strategic marketing: Creating competitive advantage* (3<sup>rd</sup> ed.). Oxford University Press, United Kingdom, p.327.
- Will, M., & Guenther, D. (2007). Food quality and safety standards. *Eschborn: Deutsche Gesellschaft fuer Technische Zusammenarbeit (GTZ) GmbH*.
- Wilson, A. M., Henderson, J., Coveney, J., Meyer, S. B., Webb, T., Calnan, M., Caraher, M., Lloyd, S., McCullum, D., Elliott, A., & Ward, P. R. (2014). Media actors' perceptions of their roles in reporting food incidents. *BMC Public Health*, 14(1), 1305.
- World Health Organization (WHO) (2015a), WHO's first ever global estimates of foodborne diseases find children under 5 account for almost one third of deaths <http://www.who.int/mediacentre/news/releases/2015/foodborne-disease-estimates/en/> (accessed 08.06.17).

WHO (2015b), Food safety: What you should know. [http://www.searo.who.int/entity/world\\_health\\_day/2015/whd-what-you-should-know/en/](http://www.searo.who.int/entity/world_health_day/2015/whd-what-you-should-know/en/) (accessed 26.01.18).

Wongprawmas, R., & Canavari, M. (2017). Consumers' willingness-to-pay for food safety labels in an emerging market: The case of fresh produce in Thailand. *Food Policy*, 69, 25-34.

World Bank. (2006). Vietnam food safety and agricultural health action plan. Report No.35231 VN.

World Bank (2016a), Vietnam food safety risk management: Challenges and opportunities. Washington, DC. <https://openknowledge.worldbank.org/bitstream/handle/10986/26411/113829-WP-P158057-PUBLIC-PolicyNoteENFINALPRINTED.pdf?sequence=1&isAllowed=y> (accessed 08.06.17).

World Bank. (2016b). Socialist Republic of Vietnam VDR: Agricultural Modernization – Transforming Vietnamese Agriculture: Gaining more from less. Report No. AUS15856.

Wu, L., Wang, S., Zhu, D., Hu, W., & Wang, H. (2015). Chinese consumers' preferences and willingness to pay for traceable food quality and safety attributes: The case of pork. *China Economic Review*, 35, 121-136.

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.

Xue, J., & Zhang, W. (2013). Understanding China's food safety problem: An analysis of 2387 incidents of acute foodborne illness. *Food Control*, 30(1), 311-317.

Yadav, R., & Pathak, G. S. (2016). Intention to purchase organic food among young consumers: Evidences from a developing nation. *Appetite*, 96, 122-128.

Yadav, R. (2016). Altruistic or egoistic: Which value promotes organic food consumption among young consumers? A study in the context of a developing nation. *Journal of Retailing and Consumer Services*, 33, 92-97.

Yeh, C. H., Hartmann, M., & Hirsch, S. (2017). Does information on equivalence of standards direct choice? Evidence for organic labels from different countries-of-origin. *Food Quality and Preference*. In Press.

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.

Yu, X., Gao, Z., & Zeng, Y. (2014). Willingness to pay for the “Green Food” in China. *Food Policy*, 45, 80-87.

Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences. *American Psychologist*, 35(2), 151-175.

Zajonc, R. B. (1986). Basic mechanisms of preference formation. In: Peterson, R. A., Hoyer, W. D., & Wilson, W. R. (Eds.), *The role of affect in consumer behaviour: Emerging theories and applications*, Lexington, Massachusetts: Lexington Books, pp. 1-16.

Zajonc, R. B., & Markus, H. (1982). Affective and cognitive factors in preferences. *Journal of Consumer Research*, 9(2), 123-131.

Zander, K., Padel, S., & Zanolli, R. (2015). EU organic logo and its perception by consumers. *British Food Journal*, 117(5), 1506-1526.



- Zanoli, R., Scarpa, R., Napolitano, F., Piasentier, E., Naspetti, S., & Bruschi, V. (2013). Organic label as an identifier of environmentally related quality: A consumer choice experiment on beef in Italy. *Renewable Agriculture and Food Systems*, 28(1), 70-79.
- Zhang, C., Bai, J., & Wahl, T. I. (2012). Consumers' willingness to pay for traceable pork, milk, and cooking oil in Nanjing, China. *Food Control*, 27(1), 21-28.
- Zheng, Y., Li, X., & Peterson, H. H. (2013). In pursuit of safe foods: Chinese preferences for soybean attributes in soymilk. *Agribusiness*, 29(3), 377-391.
- Zhu, Q., Li, Y., Geng, Y., & Qi, Y. (2013). Green food consumption intention, behaviours and influencing factors among Chinese consumers. *Food Quality and Preference*, 28(1), 279-286.



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# Summary

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There is an increasing interest in food quality and safety aspects in developing and emerging countries such as Vietnam. In addition, there is an emerging demand for environmentally friendly food in the developing world including Vietnam. In response to increasing interests in food quality and safety labels, and environmentally friendly food labels, food produced under different quality labels have appeared on the Vietnamese domestic food market. However, there is currently an uncontrollable growth and a lack of regulatory system of food labels and claims in Vietnam. In this context, this study aimed to investigate consumers' attitudes and behaviour towards food with quality labels in the Vietnamese food market. Based on the results, the study provides implications for producers, marketers and policymakers in terms of insights to develop an effective marketing strategy for food with quality labels and to build a unique food quality labelling and monitoring system in Vietnam.

This thesis has three important contributions. First, the thesis makes a significant contribution to the limited existing literature on consumers' attitudes and behaviour towards food with quality labels in the context of developing countries such as Vietnam. Second, the thesis contributes towards using a combination of different methodologies, such as consumer surveys, structural equation models, choice experiment, and experimental auctions to explore and investigate consumers' attitudes, behaviour, preferences and willingness-to-pay (WTP) for food with quality labels in the context of urban areas in Vietnam. Third, the study provides useful insights for value chain actors and policymakers in terms of developing an effective marketing strategy for the long term development of a food quality labelling and monitoring system in Vietnam. Based on the conceptual framework of the study, four research objectives were investigated.

The first research objective focused on identifying important aspects (as background information) when studying consumers' attitudes and behaviour towards food with quality labels in the Vietnamese food market. Results showed that consumers' perceived importance of intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) are positively associated with their purchase intentions towards food with quality labels for rice and vegetables. This finding highlighted the important roles of intrinsic attributes (safety, quality, health, trustworthiness) and extrinsic attributes (product labelling and packaging) when studying consumers' attitudes and behaviour towards food with quality labels in Vietnam.

The second research objective focused on exploring consumers' familiarity with, and their attitudes towards, food with quality labels in the Vietnamese food market. Results showed that

consumers' awareness of food quality-related terms was relatively low. Consumers' familiarity with different food quality certifications was also low. Results of the structural equation models showed that consumers' perceived importance of environmentally friendly behaviour relating to the purchase of quality food and food safety concern were positively associated with consumers' attitudes towards high quality rice and safe vegetables. Additionally, consumers' perceived importance of rice for healthy eating was positively associated with consumers' attitudes towards high quality rice.

The third research objective concentrated on exploring consumer purchase behaviour towards food with quality labels for rice in the Vietnamese food market. The buyers of quality-certified rice tended to have stronger beliefs in the sensory aspects, health benefits, convenience characteristics, and value for money of certified rice (compared to conventional rice) than the non-buyers. Additionally, the buyers of certified rice tended to trust more in a food quality certification system and had higher perceived self-competence in identifying certified rice. Furthermore, the urban upper-middle class consumers tended to be the buyers of certified rice.

The final research objectives focused on investigating consumers' preferences and WTP for quality rice attributes (via a choice experiment) and WTP for food with quality label for rice under different information treatments (via experimental auctions). The choice experiment study showed that consumers were willing to pay more for rice with different quality attributes including rice that is produced with sustainable production methods (Organic, Integrated Pest Management (IPM)), rice with claimed health benefits, and rice that guarantees a fair price to farmers. Therefore, rice with credence quality attributes referring to sustainability, health benefits, and fair farmer prices present promising opportunities in the Vietnamese food market. Furthermore, the experimental auctions study found that consumers were willing to pay more for sustainably-produced rice under increasing levels of information referring to quality labelling (certified sustainable production practices) and other information cues (supplementary information about the certification and traceability). Results also showed that consumers who were more health conscious, environmentally conscious and had a stronger belief in the value for money of certified rice tended to pay higher premiums. In addition, those who had better knowledge of, and higher trust in the food quality certification system, and often read food labels while purchasing food tended to pay higher premiums. Results of the experimental auctions also imply that there is an opportunity for sustainably-produced rice in the domestic food market of Vietnam as long as consumers are properly informed about the information referring to sustainable production practices and traceability.

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## **Samenvatting**

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De interesse voor voedselkwaliteit en voedselveiligheid neemt toe in ontwikkelingslanden en opkomende markten zoals Vietnam. Ook de vraag naar milieuvriendelijke voedingsmiddelen trekt aan. Voedingsmiddelen die geproduceerd worden onder toezicht van diverse kwaliteitslabels en kwaliteitssystemen bieden een antwoord op de toenemende interesse voor labels die voedselkwaliteit, voedselveiligheid en milieuvriendelijkheid signaleren op de binnenlandse markt in Vietnam. Het probleem is een ongebreidelde groei van labels en een gebrek aan regelgeving voor labels en claims in Vietnam. Binnen deze context bestudeert deze studie de houding en het gedrag van consumenten ten aanzien van kwaliteitslabels voor voeding op de Vietnamese markt. Op basis van de resultaten van de studies binnen dit doctoraat worden de gevolgen voor producenten, marketeers en beleidsmakers in kaart gebracht. Het betreft in het bijzonder inzichten voor de ontwikkeling van een effectieve marketingstrategie voor kwaliteitslabels voor voeding en van een specifiek voedselkwaliteitssysteem in Vietnam.

Dit doctoraat levert drie belangrijke bijdragen. Ten eerste levert het doctoraat een bijdrage aan de tot dusver beperkte bestaande literatuur over de houding en het gedrag van consumenten ten aanzien van kwaliteitslabels voor voeding in de context van een ontwikkelingsland zoals Vietnam. Ten tweede illustreert dit doctoraat hoe een combinatie van verschillende methodologieën, zoals consumenten-enquêtes, structural equations modellering, keuze-experimenten, en experimentele veilingen kan bijdragen tot het verschaffen van inzicht in de houding, het gedrag, de voorkeuren en de betalingsbereidheid van consumenten ten aanzien van voeding met kwaliteitslabels binnen de context van een stedelijke omgeving in Vietnam. Ten derde levert het onderzoek inzichten die nuttig zijn voor actoren in de voedselketen en beleidsmakers met het oog op de ontwikkeling van een effectieve marketingstrategie op lange termijn voor een systeem van voedselkwaliteitscertificering en etikettering in Vietnam.

Met het conceptueel kader van het doctoraat zijn vier onderzoeksdoelstellingen verbonden. De eerste doelstelling betreft het identificeren van de belangrijkste aspecten voor het bestuderen van de houding en het gedrag van consumenten ten aanzien van kwaliteitslabels voor voeding in de Vietnamese markt. Het onderzoek toont aan dat het gepercipieerde belang dat consumenten hechten aan intrinsieke kwaliteitsaspecten (veiligheid, kwaliteit, gezondheid, en betrouwbaarheid) en extrinsieke kwaliteitsaspecten (etikettering en verpakking) een positief verband heeft met hun koopintenties voor rijst en groenten met een kwaliteitslabel. Hiermee bevestigt de studie dat het relevant is om de rol van intrinsieke productkenmerken (veiligheid, kwaliteit, gezondheid, en betrouwbaarheid) en extrinsieke productkenmerken (etikettering en

verpakking) verder te bestuderen met het oog op het begrijpen van de houding en het gedrag van consumenten ten aanzien van voeding met kwaliteitslabels in Vietnam.

De tweede doelstelling onderzoekt de mate waarin Vietnamese consumenten vertrouwd zijn met kwaliteitslabels voor voeding, evenals hun houding tegenover dergelijke labels. De resultaten tonen aan dat de bekendheid van consumenten met termen die verband houden met voedselkwaliteit eerder laag is. De mate waarin consumenten vertrouwd zijn met verschillende certificeringen voor voedselkwaliteit is eveneens laag. De resultaten van de structural equations modellering tonen aan dat het gepercipieerde belang van milieuvriendelijk gedrag bij de aankoop van kwaliteitsvoeding en de bezorgdheid over voedselveiligheid positief geassocieerd zijn met de houding van consumenten ten aanzien van hoge kwaliteitsrijst en veilige groenten. Bovendien is het gepercipieerd belang van rijst binnen een gezond eetpatroon positief en direct geassocieerd met de houding van consumenten ten aanzien van hoge kwaliteitsrijst.

De derde doelstelling spitst zich toe op het koopgedrag van consumenten ten aanzien van rijst met kwaliteitslabels in de Vietnamese voedingsmarkt. In vergelijking met de niet-kopers, zijn de kopers van kwaliteitsgecertificeerde rijst sterker overtuigd van de sensorische kwaliteit, gezondheidsvoordelen, gebruiksvriendelijkheid van gecertificeerde rijst, evenals van het feit dat gecertificeerde rijst (eerder dan conventionele rijst) zijn geld waard is. Bovendien hebben kopers van gecertificeerde rijst meer vertrouwen in een systeem voor kwaliteitscertificering van voeding en hebben zij een hogere inschatting van hun eigen competentie om gecertificeerde rijst te kunnen identificeren. Vooral de stedelijke consumenten uit de midden-tot-hogere klasse blijken kopers te zijn van gecertificeerde rijst.

De vierde doelstelling onderzoekt de voorkeuren en de betalingsbereidheid van consumenten voor attributen van kwaliteitsrijst en de betalingsbereidheid voor kwaliteitsrijst met verschillende informatieboodschappen, respectievelijk door middel van een keuze-experiment door middel van een experimentele veiling. Het keuze-experiment toont aan dat consumenten bereid zijn om meer te betalen voor rijst met specifieke kwaliteitskenmerken zoals rijst die geproduceerd is door middel van duurzame productiemethoden (biologische rijst of rijst afkomstig uit productiesystemen met geïntegreerde plaagdierbeheersing (Integrated Pest Management of IPM)), rijst met beweerde gezondheidsvoordelen, en rijst die een eerlijke prijs garandeert voor de producent. Op basis hiervan wordt besloten dat de Vietnamese voedingsmarkt opportuniteiten biedt voor rijst met geloofwaardigheids(kwaliteits)kenmerken die verwijzen naar duurzaamheid, gezondheidsvoordelen, en een eerlijke prijs voor de boer. Vietnamese consumenten zijn bovendien bereid om meer te betalen voor duurzaam

geproduceerde rijst wanneer naarmate zij meer informatie krijgen over gecertificeerde duurzame productiemethoden en aanvullende informatie over de certificering en traceerbaarheid. De resultaten geven aan dat consumenten die meer gezondheidsbewust zijn, meer milieubewust zijn, en/of sterker geloven in het feit dat gecertificeerde rijst waar voor zijn geld biedt, bereid zijn om een hogere meerprijs te betalen. Andere factoren die de betalingsbereidheid doen toenemen, zijn: een betere kennis van en meer vertrouwen in systemen voor kwaliteitscertificering van voeding, evenals het vaker lezen van voedingsetiketten bij de aankoop van voeding. Deze resultaten van de experimentele veilingstudie betekenen een opportuniteit voor duurzaam geproduceerde rijst op de binnenlandse markt in Vietnam voor zover consumenten correct geïnformeerd kunnen worden over duurzame productiemethoden en traceerbaarheid.



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# Curriculum Vitae

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Nguyen Hoang Diem My graduated in 2012 with Master of Science of Rural Economics and Management at the Department of Agricultural Economics, Ghent University. After finishing her Master program, she returned to her home university (Hue University) to teach and conduct research there. In September 2014, she has been awarded a Scholarship from the Special Research Funds of Ghent University for students from developing countries (24 months of scholarship in Ghent University) to study the PhD in Rural Development at the Department of Agricultural Economics, Ghent University. My's main fields of research are food marketing and consumer behaviour, agricultural economics. Her expertise is consumers' food choices towards sustainable and environmentally friendly food labels, food marketing, consumer behaviour and decision-making, marketing of agricultural products.

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### **Training & Workshop**

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- Certificate of completion in “Introduction to Payment for the Environmental Services (PES) scheme” organised by the Australian National University and The University of Western Australia. Vientiane. 2013.
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### **Working Experiences**

From September 2014: PhD student at The Department of Agricultural Economics, Ghent University

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Research fields: Food marketing and consumer behaviour, Marketing of agriculture products, Cost-Benefit analysis of agricultural projects, Design and management of agricultural and rural development projects, Environmental valuation.

In 2012: Team member of the project “Building ecosystem services to enhance the adaptation capacity to climate change in Quy Nhon province, Vietnam”

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## **Publications**

**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.

**My, N. H. D.**, Van Loo, E. J., Rutsaert, P., Tuan, T. H., & Verbeke, W. (2017). Consumer valuation of quality rice attributes in a developing economy: Evidence from a choice experiment in Vietnam. *British Food Journal* (In Press).

**My, N. H. D.**, Demont, M., Van Loo, E. J., de Guia, A., Rutsaert, P., Tuan, T. H., & Verbeke, W. (2017). What is the value of sustainably-produced rice? Consumer evidence from experimental auctions in Vietnam. *Food Policy* (Under Review).

Van Loo, E. J., **My, N. H. D.**, Pieniak, Z., & Verbeke, W. (2013). Consumer attitudes, knowledge, and consumption of organic yogurt. *Journal of Dairy Science*, 96(4), 2118-2129.

Tuan, T. H., **My, N. H. D.**, Anh, L. T. Q. & Van Toan, N. (2014). Using contingent valuation method to estimate the WTP for mangrove restoration under the context of climate change: A case study of Thi Nai lagoon, Quy Nhon city, Vietnam. *Ocean & Coastal Management*, 95, 198-212.

**My, N. H. D.** (2012). Consumer perception on environmental information on food labels. MSc Thesis.

## **Courses at the doctoral school**

Advanced Market Research Methods, Presentation Skills, Leadership Foundation Course, Methods in Research Design, Methods in Data Collection.