J. ISSAAS Vol. 29, No. 2: 131-148 (2023)

FACTORS INFLUENCING VIETGAP CERTIFIED VEGETABLE PURCHASING INTENTION OF VIETNAMESE CONSUMERS

Ngo Xuan Duc, Tomohiro Uchiyama, Ramadhona Saville, Nina N. Shimoguchi and Rika Terano*
Department of International Agribusiness Management,
Graduate School of International Food and Agricultural Studies, Tokyo University of Agriculture
*Corresponding author: rt200005@nodai.ac.jp

(Received: April 28, 2023; Accepted: November 23, 2023)

ABSTRACT

Since the 1990s, the presence of chemical residues in agricultural products led to severe health problems among Vietnamese consumers. In 2008, the introduction of Vietnamese Good Agricultural Practices (VietGAP) helped consumers gradually become conscious about what they eat. Although VietGAP certified vegetables are more readily available in the market, only a few frequent buyers exist. The emergence of online marketing channels makes it important to target online consumers as samples for the study, which aims to determine the effects of attributes, consumers' attitudes, awareness, knowledge, perceived behavioral control (PBC), and subjective norms on VietGAP vegetable buying intention, using the Theory of Planned Behavior. Data collection was handled in 2022, from 301 consumers in Hanoi and Ho Chi Minh, Viet Nam using an online questionnaire. Principal component analysis and regression analysis revealed that 11 extracted components, income, and vegetable purchasing frequency, have positive effects on the intention to buy, whereas living with family, and age will produce the reverse effect. Vegetable purchasing on an everyday basis has the highest influence, followed by PBC, promotion of domestic products, health concerns, availability, and beliefs. The study also gives some recommendations to enhance the buying intention, such as improvement of production quantity, designs of stores and online interface, production supervision, and promotions of government.

Key words: buying intention, online consumer, safe vegetable, Theory of Planned Behavior, Vietnamese consumer

INTRODUCTION

In Vietnam, as in other developing countries, rapid socioeconomic development is accompanied by agriculture, forestry, and fisheries modernization and industrialization of production. However, along with that development is the problem that pesticide is increasingly utilized in the agricultural field, no matter how much the government tried to enact and expand regulations on pesticide management from 2005 to 2015. Moreover, the available amount of pesticides in the market and the used amount on the farm are strongly connected (Pham et al. 2016). Import of pesticides increased annually from 2009-2012, since 2015, the number has stabilized at around 100,000 tons a year, and farmers have made use of plant protection chemicals as one of their cultivating habits (Nguyen 2020), conveying that there may be prevalent overuse of pesticides in terms of quantity, frequency of application, and time of use. Moreover, among 4,000 permitted pesticides and plant protection substances in Vietnam, only 20% are biological, and the others remain chemicals, which most farmers prefer. As a result, many cases of food poisoning took place all over the country. For instance, from 2019 to 2020, it was recorded as 153 outbreaks with 3,977 injured and 31 deaths (General Statistics Organization 2020). Moreover, the Vietnamese take vegetables as the second most crucial foodstuff,

only after rice, however, together with fruits, vegetables use pesticides more than any other crops (Nguyen et al. 2018). This phenomenon raises the importance of food safety and the environment, which affects public health, leading food safety, especially vegetable safety, to be one of the country's most concerned and prioritized social issues when there is an excessive amount of chemicals used to increase the yield on vegetable crops all over the country (Pham et al. 2016). Therefore, in order to cope with the vegetable production issue, the Vietnamese government implemented the "Safe Vegetables" program in 1995 as the premise for the Ministry of Agriculture and Rural Development (MARD) to establish Vietnamese Good Agricultural Practices (VietGAP) in 2008. VietGAP soon became the main standard, and guidelines for producing clean, safe, and health-friendly agriculture products in response to the negative context of food safety.

In recent times, the production of safe vegetables has seen a surge in adopting safety measures such as adhering to global and domestic standards, organic and GAP practices, which has resulted in an increase in the production and cultivated area of vegetables. As of 2018, the number of VietGAP-certified farms rose to almost 1,900, covering an area of 81,500 hectares. In addition, a report by the Agro-Forestry-Fisheries Quality Assurance Department revealed that as of mid-2022, the country certified 463,000 hectares of crops and 6,211 farming establishments as VietGAP certified (An 2022). The percentage of modern retailers has risen from 5% in 2016 to 10-15% in 2019 in the total number of whole retailers in Viet Nam (Hanoi Department of Plant Protection N.A.) with the involvement of more multidisciplinary corporations such as PAN Group, Vingroup, FPT, in the agricultural sector, especially GAP vegetables. In the case of Hanoi, safe vegetable growing models became beneficial to producers and consumers. The city issued many policies to support farmers to promote the production and consumption of safe vegetables (Hanoimoi News 2020). In the long run, the Hanoi City People's Committee authorized the plan for a safe vegetable network towards 2020, the area for vegetable production in the whole city is more than 16,276 ha, of which 151 areas with a total area of more than 6,644 ha (average 44 ha/region) concentrated on safe vegetable production is. Prior to this plan, the area allocated for safe vegetable production in the city was 5,044 ha, with an output of nearly 400,000 tons per year, meeting 40% of Hanoi's demand. The area certified by VietGAP standards is 521.6 hectares, and approximately 50 hectares are certified with organic standards. Moreover, the attained economic efficiency of growing safe vegetables is 10 to 20% higher than that of conventional vegetables, the production value is from 300 to 500 million VND/ha/year, and about 1,200 ha is worth 1 billion VND/ha/year due to vegetable production in greenhouses, net houses, and off-season cultivation. The city's leading suppliers for safe vegetable production are cooperatives and enterprises that participate in producing safe vegetables (Hanoi Department of Agriculture and Rural Development N.A.).

Although it takes more investment and training for farmers to grow safe vegetables (MARD 2008), the consumption of safe vegetables has not increased as expected. In 2018, the Hanoi Division of Plant Protection, which belongs to Hanoi Department of Agriculture and Rural Development, stated that safe vegetables have 40% of the total vegetable consumption in Hanoi, however, only 20% of safe vegetable consumers are frequent consumers purchasing safe vegetables. Many farmers who produce safe vegetables face difficulties selling their produce in supermarkets and vendor stores. Only a few vegetable buyers choose safe vegetables due to their high prices. In addition, according to usual observations, there is another issue that some safe vegetables, whose prices are ranged only from 1,000 to 2,000 VND (0.041 - 0.083 USD), which is slightly higher than the conventional counterpart in many supermarkets and online stores in various e-commerce platforms, could not get an as good amount of consumption as traditional vegetables'. Moreover, recently there has been a conspicuous issue: it has been detected that plenty of agricultural products with the VietGAP logo on the package as Vietnamese vegetables come from China and do not undergo any safe vegetable production or verification process. In short, they are non-VietGAP products sold to retail markets and supermarket chains like Bach hoa xanh and Winmart - famous chain stores selling fresh vegetables (Mai et al. 2022), under the VietGAP standard label. Therefore, there might have been a lack of recognition and belief for GAP vegetables among consumers.

When a pandemic breaks out, people tend to follow a certain diet to protect themselves and enhance their immune system for their health (Rodríguez et al. 2020). The demand for food containing biologically active ingredients or food groups with vitamin supplements, such as fruits and some vegetables, increased. A survey conducted in Vietnam found that lockdown during the early part of the severe phase of the Covid-19 pandemic caused 45% of consumers to stockpile food at home, a higher number than before, 50% of whom reduce the frequency of going to places like supermarkets, grocery stores to buy goods and 25% of people limit eating out activities (Nielsen 2020). Aside from the lockdown period, housewives are also gradually reducing the habit of going to the market to buy daily food, and the 9X generation is more interested in green living (Thuy 2020). They tend to spend more time in supermarkets, and are more likely to find VietGAP vegetables intentionally or by chance. Besides, an investigation by MARD indicated that in the early phase of social isolation in the second quarter of 2021, there were 3.7 million tons of fruits and vegetables in 26 provinces that needed support in terms of circulation to be consumed. The situation is similar in many other countries, such as India, where a significant number of vegetable farmers reported a decrease in prices, with more than 80% of farmers reporting reductions by more than half and a drop in farm income for 90% of farms, of which 60% experience a decrease of more than 50% (Harris et al. 2020). As a result, both providers and consumers sought online channels to sell and buy products with the government's support. On July 21st, 2021, the Ministry of Information and Communications approved the plan to facilitate agricultural production on e-commerce platforms, with the view of reinforcing the digital economy, agriculture, and rural areas. Interviews conducted by government electronic news for Hanoi and Ho Chi Minh City inhabitants about GAP vegetables also implied the rising awareness of GAP vegetables among consumers, thanks to the exposition to e-commerce platforms, which seems to be a bright prospect for VietGAP vegetable consumption, considering the low infrequent buyer percentage of safe vegetable in 2018. Therefore, this study aimed to find out the determinants of consumers' intention to buy VietGAP vegetables in the new era when shopping is done in a more accessible way.

Several studies focused on the variables affecting consumers' intention to buy fresh foods, both domestically and internationally. In Slovenia, purchasing intention for fresh fruits and vegetables is affected by the availability of retail stores, consumers' income, consideration of health and environment, and visual appeal (Kuhar and Juvancic 2010). In Malaysia, two factors: health consciousness and perceived value influence positively the intention to buy organic products (Shaharudin et al. 2010). There is a reverse relationship between the perception of quality and risk affecting purchase intention (Alamsyah and Angliawati 2015). Health concerns, perceived quality, health security concerns, beliefs, and higher price for safe food products affect the behavior of consumers in the UK (Dickieson et al. 2009). Perceived organic information positively impacts organic food consumers' attitudes and trust in Indonesia (Secapramana and Katargo 2019). In Tanzania, three components of TPB and health consciousness proved to be the criteria for the extent to which consumers are willing to buy organic foods when knowledge plays as a moderator for the impact of these determinants on buying intention. However, this study showed an insignificant relation of perceived behavioral control with purchasing intention in Kenya (Wang et al. 2019).

Recent research on safe vegetable awareness and consumer behavior in Vietnam, including GAP and organic vegetables, has been conducted. Determinants of the buying intention for safe vegetables in Gia Lam and Long Bien Districts, Hanoi were investigated (Do et al. 2015). It showed that consumers' perception of safe vegetables is still limited, and the intention to buy relies on factors such as age, safe vegetables buying experience, perception of safe vegetables, awareness of what safe vegetables bring about, and sensitivity level about price. Another study claimed that Hanoi consumers prioritize the presence of safety labels or logos on the products, followed by traceability information, availability, and price (Thai et al. 2015). Significant effects of attitudes towards the environment, perceived value, concern about health, knowledge of organic foods, and subjective norms on the attitudes toward organic foods and the purchase intention of organic food consumers in Hanoi and Ho Chi Minh City (Nguyen 2014). Besides, there is a highly positive connection between the attitudes

toward organic food and customers' intention to buy organic foods. TPB was used in a study on the following factors influencing safe vegetable buying intention of Ho Chi Minh City consumers: trust in safe vegetables and distributors, concern about health and environment, subjective norm, attitude towards price, and attitude towards convenience (Pham 2016). The attitude towards convenience did not influence the intention to buy. Only attitude towards price has a negative correlation with the intention, and the rest factors have positive impacts with the descending order of impact level: trust, concern, and subjective norm. The four factors that affected safe vegetable purchasing intention, arranged by level decreasing order: concern about health and safe vegetable quality, subjective norm, environmental concern, and price (Ha et al. 2017). The inexistence of the direct impact of a higher level of awareness about organic foods and the information provided on organic food labels and a more positive attitude towards organic food has also been explored (Huynh and Ha 2021).

In summary, most international studies imply that vegetable attributes like price, freshness, appearance, color, taste, nutrition value, and availability statistically influence significantly the intention to buy safe or fresh vegetables. On the other hand, domestic studies tend to prove that consumers' consciousness, perception, and experience have influences on the intention. Besides, most studies have not mentioned much about online consumption, which recently emerged actively in the marketing channel of vegetables.

CONCEPTUAL FRAMEWORK

Intention to behave is influenced by three factors: belief in behavior, belief in standards, and belief in control (Ajzen 2002). When these become intense, people are more likely to perform a particular action. The Theory of Planned Behavior (TPB) is a theory growing from the base of the Theory of Reasoned Action (TRA) which emphasizes the importance of intention in driving behavior (Ajzen 1991; Ajzen and Fishbein 1975). It represents the extent to which people will put effort in or how much attempt they intend to make to perform a particular behavior. The TPB suggests that intention is controlled by: (1) attitude, (2) subjective norm, and (3) perceived behavioral control. Researchers have used widely this theory to explain the purchase intention of various food products (Table 1).

Although there have been some studies about determinants of consumer's VietGAP vegetable buying intention, the number of research in this field is still limited, and they did not consider e-commerce platform characteristics which consist of shipping service, promotion, superior availability as well as VietGAP vegetable attributes that were related to vegetable online consumption channel (storage, shipping service and the like). In the online consumption explosion era, those features must be taken into account to find out elements that can manipulate the intention to acquire VietGAP vegetables of consumers in this study. Therefore, based on past studies applying TPB and the necessity to consider more factors, this study suggested the conceptual framework and its component descriptions as showed in Table 2.

A positive attitude is an important premise that promotes the intention to buy Teng and Wang (2015). The more favorable one's attitude is toward behavior, the more likely that the individual intends to perform the behavior. For subjective norm, it is determined by the belief that influencers think that this individual should perform the behavior (Ajzen 2002). Perceived behavioral control is defined as how a person perceives their action based on their abilities (Sentosa and Mat 2012). Knowledge is a tool to gauge the perceptions regarding the level of understanding that consumers have (Chen 2008).

Traceability in vegetable production, as defined by EC regulation 178/2002 is the ability to follow a vegetable product through all phases of its production and distribution. Even though Vietnamese government introduced food the concept of traceability in safety laws ever since 2010, among consumers, there is a deterioration of preference on traceable foods in general due to the harmful food context of Vietnamese food safety (Dang et. al. 2020). Li and Nguyen (2015) indicated that

traceability is a factor that reduces uncertaintie and raise consumer's intention to purchase as even repeaters. This study includes traceability as one factor to be tested whether there exists an influence on intention.

In Vietnamese families, it is conventionally assumed that women are responsible for the family's three meals a day and therefore become the food-purchasing decision-makers. However, those who decide what to eat and what to buy are not necessarily those who actually buy, and the decision will differ depending on who an individual lives with. As a result, the consciousness, and attitudes of consumers vary based on multiple socio-demographic features. Additionally, during the pandemic, shopping behavior of consumers has changed drastically, in terms of location, quantity, and frequency. In this study, the authors agree to choose whether living with family, cooking for the family, buying food for the family, measured as dichotomous data. For frequency of purchase, the authors intended to test this variable using Likert scale, however, the test result showed to have unstable change in influence on intention among the levels of frequency rather than every day. Therefore, the authors tried to group those into one and make this variable dichotomous data. Moreover, the authors take experience of buying VietGAP products as an independent variable.

Table 1. Conceptual framework description regarding consumers' intention to purchase

Variables	Description
Attitude	Individual's attitude is the positive or negative feeling of the individual about buying VietGAP vegetables, whether it is positive or negative: *Belief (an individual's faith on various aspects regarding VietGAP vegetables and VietGAP vegetable production)*, Domestic product and producer consciousness, Environmental concerns, Health concerns
Perceived behavioral control	An individual's perceived ease or difficulty buying VietGAP vegetables
Subjective norm	An individual's perception about buying VietGAP vegetables, which is influenced by the judgment of significant others
Awareness	An individual's recognition ability of VietGAP vegetables under various aspects
Knowledge	An individual's actual understanding extent about VietGAP and VietGAP vegetable about various aspects
Attributes	VietGAP vegetables' features: *Price*, *Quality*, *Appearance and packaging*, *Information and traceability*, *Availability*
Demographics	An individual's private information: *Gender*, *Age*, *Income level*, *The cooking role for family*, *Religion*
Intention	An individual's likelihood to buy VietGAP vegetables, considering its being influenced by all other factors

Source: Adapted from the original model by Ajzen (1985, 1991): Compiled from Ajzen and other past studies' models; Attitudes, perceived behavioral control, subjective norm intention (Ajzen 1985); Knowledge (Secapramana and Katargo 2019); Price, availability (Le 2017); Appearance (Nguyen 2012); Quality, information and traceability (Dickieson and Arkus 2009).

METHODOLOGY

Study area. This study conducted an online survey of Hanoi and Ho Chi Minh inhabitants to capture the fundamental demographic features and their attitudes toward various aspects of VietGAP vegetables**.** Hanoi serves as Vietnam's capital city. It consists of twelve urban districts, one town at the district level, and seventeen rural districts. With an area covering 3,359.82 km^2, after Ho Chi Minh City, Hanoi is the country's second-largest cultural and political hub. It is situated in Northern Vietnam. In the early stage of the safe vegetable program, Hanoi was picked as the first experimental spot for the program due to its main market of vegetables in the country. Based on the information provided by MARD (2015), the demand for green vegetables in the capital city amounts to 950,000 tons per year. Ho Chi Minh City, the country's largest city, possessing a population of around 9.17 million, ranking first above Hanoi, has 8.33 million residents in 2021, occupying 2,061 km^2 in the Southeast region. Both cities are major economic centers of the country, representing the economy of the two areas. They also possess a large population and high average income and attract people from other provinces. With a high economic growth rate, these cities have a significant number of consumers with great demands for vegetables and, as a result, have become places where vegetables coming from many places are distributed. Moreover, consumers in these cities are incredibly up-to-date and highly concerned about smart expenditure and health; most people in the cities are also sensitive to the development of technology. Therefore, conducting the research will be advantageous, and the research results will be meaningful.

Data selection and collection. The survey was conducted during January 2022 and November 2022. The data collection is conducted through an online questionnaire survey, targeting both physical store-visiting and online consumers, residing in the two areas. The questionnaire was distributed randomly to over 300 people over 18 years old. According to World Health Organization, "young people" are defined as individuals whose age is from 10 to 24, and Ha and Ha (2017), in the study of consumer attitude and intention to buy VietGAP vegetables, decided to take 18-25 as one category, moreover, from 26 years old, an individual is considered having changed to another stage of life, therefore, collected age data will be recoded into two groups which are young people ($\leq$ 25 years old) and older people. What is more, the frequency of buying vegetables is inquired, and buying as a daily habit is considered one category besides the rest. Principal component analysis and ordinal logistic regression were used to evaluate the model's reliability and determine the latent variables as well as the available variables in the hypothetical model that influence the buying intention of VietGAP vegetables. Besides, the correlation analysis was also conducted. The measurement applied the 5-point Likert scale: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree. The authors used Ordinal Logistic Regression (OLR) for the the dependent variable Intention (INT: I am very likely to buy VietGAP vegetables) with those 5 points of Likert scale.

Selection of sample size: A sample size of at least 100 is recommended, with the smallest sample having an expected ratio of 5 observations per variable (Hair et al. 2010). The sample size should therefore be greater than or equal to 100 and should be calculated as $n \geq 5k$ (where k is the number of variables). Initially the study aimed for a large set of variables, however, due to the spatial barrier, the survey obtained a smaller number of variables in total than expected in the study. There are 301 variables collected in the questionnaire, which means that the maximum number of independent variables that can be included in the analyses is 60. Representative observed variables were chosen in each construct and in the end, 59 variables were selected for further evaluation.

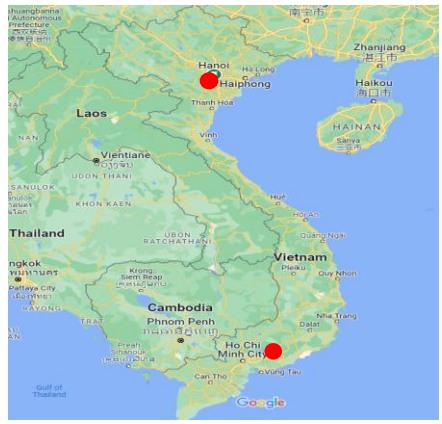

Fig. 1. Map of the study area, Hanoi and Ho Chi Minh City

Method of analyses. Cronbach's Alpha is utilized to evaluate measurement scales' reliability. The greater the Cronbach's Alpha coefficient, the stronger the correlation between the scale's variables. However, many variables on the scale will not differ if Cronbach's Alpha is this high (>0.95), indicating that they measure the same study concept content (Nguyen 2013). Cronbach's Alpha coefficients of 0.8 to 1 indicated a good scale, 0.7 to almost 0.8 indicated a usable scale, and > 0.6 indicated an acceptable scale in situations where the topic is novel or studied in a novel setting (Hair et al. 2010), with corrected item - total correlation smaller than 0.30, the item is unacceptable (Cristobal et al. 2007). Besides, Cronbach's Alpha coefficient if deleting an item must be smaller than Cronbach's Alpha coefficient of the scale (Hoang and Chu 2008).

Principal component analysis: Conditions to consider whether to keep or eliminate variables are Factor loadings, Eigenvalue, and Percentage of variance. A variable is kept when the loading score exceeds 0.3, Eigenvalue surpasses 1, and the Percentage of variance is over 50% (Anderson and Gerbing 1988).

Ordinal logistic regression model: Consumers' intention to purchase VietGAP vegetables is measured as an orderly 5-point categorized dependent variable for the statement: 'I am likely to buy VietGAP vegetables', including strongly disagree, disagree, unsure, agree, and strongly agree. This study employs a multivariate ordered logistic model to examine the key influencing factors. The authors select the logistic model for the reason that its variables may not satisfy the demands of normal distribution. The dependent variable, demonstrated by Y, is continuous with an ordinal scale, categorized as j = 1, 2, 3, …, J, then the cumulative probability of Y less than or equal to a certain category j = 1,…, J-1, is represented by $P(Y \leq j)$, with $P(Y \leq J) = 1$ (Nguyen, 2019). The odds ratio of Y being less than or equal to a specific category can be interpreted as $\frac{P(Y \leq j)}{1-P(Y \leq j)}$ for j = 1, …, J-1 since $P(Y > J) = 0$, or $1 - P(Y \leq J) = 0$ (Parry, 2020).

Log odds is known as the logit, and it is common to interpret coefficients via odds ratio, in SPSS, the odds ratio is figured out by taking exp(β).

$$\text{Logit}[P(Y \leq j)] = \ln\left[\frac{P(y \leq j)}{1-P(y \leq j)}\right] = \alpha_j + \beta X \qquad j = 1, \ldots, J\text{-}1 \qquad \text{(Nguyen 2019)}$$

This logistic model here includes the intercept parameters α_j (also termed the cutting point, $\alpha_1 \leq \alpha_2 \leq \ldots \leq \alpha_{J-1}$), and the coefficient β for the independent variable vector X, where covariates X_i are the p-dimensional vectors of explanatory variables (i = 1,2…., p), in this case, X_i denotes any index that has an impact on consumers' purchasing intention of VietGAP vegetable. This study considers Y as

consumers' VietGAP vegetable buying intention with five categories above, and 19 independent variables as part of the analysis. Table 8 shows how the categorical variables are recoded before being incorporated in the regression analysis.

Table 2. Item coding

Item	Categories	Code	Item	Categories	Code
Vegetable purchase frequency	Less frequent	0	Likert	Strongly disagree	1
(VPF)	Every day	1	scales	Disagree	2
Age	Older	0		Neutral	3
	Young	1		Agree	4
Live with family; Cook for				Strongly agree	5
family; Food purchase for the	No	0	Gender	Female	0
family; GAP buying experience	Yes	1		Male	1

Source: Survey, 2022

RESULTS AND DISCUSSION

Characteristics of the respondents. The number of attained survey respondents is originally 334. The screening and filtering helped the authors to eliminate 33 invalid cases, the remaining 301 (90.1% valid cases) are used for analysis, as shown in Table 3. The majority of respondents are female, with almost 59% of the respondents. Respondents' age ranges from 18 to 36 years old, with an average of 24.07 years old; most are single because the questionnaire was distributed online through social network groups, where active users are primarily young, already working, or still studying in college. Regarding religion, respondents are divided into two main groups: Buddhists, accounting for approximately 48%, and the rest, including Catholics. Also, data implied that more than three-quarters of respondents have experience buying VietGAP vegetables. Income was measured in individual and monthly amounts because of the online survey and the fact that the majority are undergraduates, therefore, the revenue of respondents is hugely different from one another's. Some respondents are students living on family support, and their income was noted as zero. Vegetable purchase frequency is measured on two scales (Table 3), with around 17% of respondents shopping daily for vegetables.

Table 3. General profile of respondents (n=301)

Item	Code	No	%	Item	Code	No.	%
Gender	Female	177	58.8	Cooking	No	111	36.9
	Male	124	41.2	responsibility	Yes	190	63.1
Religion	No religion	132	43.9				
	Catholicism	24	8.0	Food purchase	No	147	48.8
	Buddhism	145	48.2	responsibility	Yes	154	51.2
Marital status	Single	255	84.7				
	Married	46	15.3	Vegetable purchase	Less frequent	251	83.4
Education level	High school	57	18.9	frequency (VPF)	Every day	50	16.6
	Undergraduate	188	62.5				
	Graduate	56	18.6	Age (as categories)	Young	208	69.1
Employment	Unemployed	85	28.2		Older	93	30.9
	Work part-time	91	30.2	VietGAP vegetable	Inexperienced	72	23.9
	Work full-time	125	41,5	purchase experience	Experienced	229	76.1

Living status	Outside home	110	36.5
	With family	191	63.5
	Value range		Mean
Age	18-36		24.07
Income (VND)	0 – 30,000,000		7,897,009.97

Source: Survey, 2022

Reliability of the model. Throughout the survey, 59 measured variables are grouped in 13 different scales. Cronbach's Alpha of the scale 'Price' (measuring consumer's perception of VietGAP vegetables' price) is 0.854, which is acceptable (> 0.6), corrected item - total correlation index of all the included variables are all greater or equal 0.587 (> 0.3), and the case of Cronbach's Alpha coefficient increasing when one variable is excluded does not occur. Therefore, the scale 'Price' is qualified with four variables.

Cronbach's Alpha of the scale 'Quality' - measuring consumer's perception of VietGAP vegetables' features regarding quality - is 0.810. This scale's corrected item - total correlation of all the composing variables has the smallest value at 0.559. Also, Cronbach's Alpha of the scale will decline if one item is eliminated. Thus, four observed variables are preserved for the subsequent analyses. In the same way, scales 'Appearance and packaging' - assessing an individual's perception of VietGAP vegetables' exterior features, 'Information and traceability' - measuring a person's perception of information sufficiency, 'Availability' which measures an individual's perception of accessibility, 'Belief' that measures an individual's beliefs on products and producers, 'Domestic products and producers' consciousness' - measuring consumer's domestic product support, 'Environment concern' - estimating one's perception of VietGAP vegetables' effect on the environment, 'Health concerns' - measuring the perception of VietGAP vegetables' effect on consumer and producer's health, 'Perceived behavioral control', 'Awareness', 'Knowledge', and 'Subjective norm' are respectively qualified with the number of variables as described on the tables.

To sum up, the reliability test result in Table 4 showed that all the scales meet the requirements in terms of reliability with Cronbach's Alpha equal to or higher than 0.6, and all the corrected item - total correlation values equal or exceed 0.3, hence, it is acceptable to proceed to principal component analysis.

Table 4. Reliability test result

Item	Number of variables	Cronbach's alpha	Corrected Item-Total Correlation minimum
Price	5	0.854	0.587
Quality	4	0.810	0.559
Appearance and packaging	6	0.881	0.609
Information and traceability	5	0.875	0.634
Availability	4	0.849	0.668
Beliefs	4	0.902	0.724
Domestic products and producers' consciousness	5	0.887	0.631
Environment concern	4	0.867	0.706
Health concerns	4	0.846	0.516
Perceived behavioral control	6	0.867	0.453
Awareness	4	0.848	0.648
Knowledge	4	0.859	0.662
Subjective norm	4	0.820	0.564

Source: Data analysis by SPSS using survey data

Principal component analysis. Principal component analysis with the varimax rotation method for 59 variables (Kaiser 1958) is applied to extract multiple variances from the measured variables with the smallest number of components to serve the forecasting objective (Dunteman 1989; Hair et al. 2010). The result showed that four variables were eliminated from the model due to unqualified loading scores. After processing the analysis results, the rotated component matrix table showed the adjusted model (Table 5). There are 55 observed variables divided into 12 components, with relatively high total cumulative variances explained (70.191% > 50%), component scores are all above 0.5 (KMO = 0.934) (Kaiser 1974), the p-value of the Bartlett test is 0.000 (<0.05). Therefore, the modified model with 12 components and 55 variables is appropriate for further analysis.

Based on the theoretical basis and existing observed variables in each group, the scales of independent variables are adjusted as follows:

The component on Appearance and packaging remained six variables from the original scales' Appearance and packaging', describing the consumer's view of the product's exterior. The Promotion of domestic products component, with five variables, represents consumers' stimulation of advocating domestic product which is highly recommended by the country. Component Traceability has five items from the scale 'Information and traceability', which is how an individual feels about the portraited information and QR code accessibility. Then the Price evaluation component adopts five items from the scale 'Price', which are all about the matter of price when it comes to VietGAP vegetables, in consumers' viewpoints. Following is the Awareness component, containing four items, which reflect the ability of ordinary consumers to realize VietGAP vegetables in daily life. Component Perceived behavioral control owns five variables about the scale' Perceived behavioral control', as its definition, this component wraps up the personal feeling of difficulty enacting the purchasing behavior. Component Beliefs on VietGAP production, comprising four items taken from the 'Belief' scale, lists consumer belief in various aspects of VietGAP vegetables. Component Environmental concern, having four observed variables from the same scale, is the buyer's sense of environment when consuming VietGAP products. The Attained Knowledge of VietGAP component is the assemble of four items of the 'Knowledge' scale, showing the understanding of consumers on VietGAP vegetables, based on what they have learned or what they have themselves experienced. Next, the tenth component, Availability of VietGAP vegetables, consists of four variables in the scale 'Availability'. It reflects how people get access to the presence of vegetables. After that is the Subjective norm component, which involves the belief of the consumer about whether the purchasing behavior are affected by the significant others' approval or disapproval. The last component, Concern about health, has three items on the 'Health concerns' scale and two on the 'Quality' scale, and all mention how one pays attention to the effect of VietGAP on health care. Consequently, the author combined them as one group mentioning Health concerns.

Table 5. Rotated component matrix of principal component analysis.

Component 1: Appearance and package (X_1)	*Subtotal variance: 34.244*	**Score**
VietGAP vegetables bring safety image		0.747
VietGAP vegetables packaging is simple		0.743
VietGAP vegetables stand out when being placed near conventional vegetables		0.708
VietGAP vegetables look fresher than conventional vegetables		0.691
VietGAP vegetables look exactly like what was promoted on TV		0.644
Appearance is important for me when I buy vegetables		0.545
Component 2: Promotion of domestic products (X_2)	*Subtotal variance: 6.625*	**Score**
By consuming domestic vegetables, I can indirectly help farmers to improve their income		0.787
People are encouraged to consume domestic products by the government		0.765
Consumption and feedback are the key to production improvement		0.722

Domestic products bring creditable feelings	0.653
Buying VietGAP vegetables is a way of advocating the domestic products	0.652
Component 3: Traceability (X_3) *Subtotal variance: 4.930*	
QR codes on VietGAP vegetable products are readily found on the package	0.812
By scanning QR codes on VietGAP vegetable products, customer can access to necessary information	0.742
VietGAP vegetable logo, package provide adequate information regarding products	0.731
Association that managing GAP participants often update statistics about numbers, places, products of participants	0.730
VietGAP vegetables' logo and package provide accurate information about product	0.610
Component 4: Price evaluation (X_4) *Subtotal variance: 4.283*	
VietGAP vegetables being of higher price is also an indication of its being tastier	0.796
VietGAP vegetables are expensive	0.755
I think paying highly for VietGAP vegetables is necessary	0.726
I think price does not matter when I buy VietGAP vegetables	0.653
I usually applied vouchers when I buy VietGAP vegetables online	0.567
Component 5: Awareness of VietGAP (X_5) *Subtotal variance: 3.359*	
On average, people in Hanoi once heard about VietGAP vegetables and saw it	0.797
Convenience stores/Supermarkets have special corner for promoting VietGAP vegetables	0.769
Due to the effect of Covid-19, the number of people seeking VietGAP vegetables is increasing	0.745
Agriculture promoting TV programs positively widen the image and information about GAP vegetable to people	0.745
Component 6: Perceived behavioral control (X_6) *Subtotal variance: 2.979*	
I feel confident to buy VietGAP vegetables because the government is supporting VietGAP products	0.683
I find it easy to consume VietGAP vegetables because I can access full information through its QR code	0.628
I find it easy to buy VietGAP vegetables because I can effortlessly distinguish it from conventional vegetables	0.618
I find it comfortable to buy VietGAP vegetables because e-commerce basis provides me a lot of promotion, deals	0.581
I feel confident to buy VietGAP vegetables because the government stimulates people to consume VietGAP products	0.559
Component 7: Beliefs on VietGAP production (X_7) *Subtotal variance: 2.778*	
I believe that large corporation has a role on leading farmers to produce VietGAP vegetables in terms of technique	0.782
I believe in VietGAP vegetable advertisements	0.739
I believe VietGAP vegetable sellers are guaranteed with quality certificate	0.720
I believe that large corporation follow the GAP instruction to produce vegetables	0.714
Component 8: Environmental concern (X_8) *Subtotal variance: 2.745*	
Consuming VietGAP vegetables is a means of protecting animal habitat	0.763
It is important to produce environmentally friendly vegetables	0.753
Green consumption is highly recommended by the government to protect the environment	0.717
Advertisements regarding environmental protection usually include VietGAP	0.716

	Score
Component 9: Attained Knowledge of VietGAP (X_9) *Subtotal variance: 2.302*	
To understand the standard is essential before consuming	0.768
Due to Covid-19, many consumers have to shift to online shopping, thus learn more about GAP because GAP vegetables are highly promoted there	0.720
The government is widening the GAP knowledge for farmers	0.674
I have learnt about VietGAP standard	0.663
Component 10: Availability of VietGAP vegetables (X_{10}) *Subtotal variance: 2.080*	
The e-commerce platform I use provides VietGAP vegetables	0.684
VietGAP vegetables are available in places that are not far from my house	0.680
The place where I usually buy VietGAP vegetables provide all kinds of vegetables that I need	0.662
The shipping service for VietGAP vegetables from online shops is fast and 24/7	0.650
Component 11: Subjective norm (X_{11}) *Subtotal variance: 2.008*	
People who are close to me agree that spending much on VietGAP vegetables is wasteful	0.767
My friends suggest that I consume VietGAP vegetables	0.696
A lot of people I know are consuming VietGAP vegetables regularly	0.659
Promotions on supermarket stimulate me to buy VietGAP vegetables	0.614
Component 12: Concern about health (X_{12}) *Subtotal variance: 1.857*	
VietGAP vegetables are good for consumer's health	0.655
Planting VietGAP vegetables reduces the burden on farmers' health	0.637
Consuming VietGAP vegetables raise the awareness standard of health care	0.584
Chemical residuals in VietGAP vegetables are within permitted quota	0.580
Farming practice for VietGAP vegetables is well abided by the farmers	0.533
Total variance: 70.191	

Source: Data analysis by SPSS using survey data

The revised model, which contains 12 components, is then put into a re-reliability test to confirm the constructs' validity. All the new scales meet the requirements in terms of reliability with Cronbach's Alpha above 0.6, the whole corrected item - total correlation indexes go beyond 0.3, with no increasing Cronbach's Alpha in case of deleting any item. Therefore, it is suitable for logistic regression analysis (Table 6).

Table 6. Reliability test for revised model's scales

Component	Name	Number of variables	Cronbach's alpha	Corrected Item-Total Correlation minimum
Appearance and package	X_1	6	0.881	0.609
Promotion of domestic products	X_2	5	0.887	0.631
Traceability	X_3	5	0.875	0.634
Price evaluation	X_4	5	0.854	0.587
Awareness of VietGAP	X_5	4	0.848	0.648
Perceived behavioral control	X_6	5	0.883	0.677
Beliefs on VietGAP production	X_7	4	0.902	0.724
Environmental concern	X_8	4	0.867	0.706
Attained Knowledge of VietGAP	X_9	4	0.859	0.662
Availability of VietGAP vegetables	X_{10}	4	0.849	0.668
Subjective norm	X_{11}	4	0.820	0.564
Concern about health	X_{12}	5	0.844	0.584

Source: Data analysis by SPSS using survey data

Ordinal Logistic Regression. In this logistic model, there are four cut-points (because the dependent variable is divided into five intervals according to ordinal scales), which are all statistically significant (Table 9, dependent variable). Therefore, it is necessary to measure Intention with five scales as it is. Independent variables are seven components that are attained from Principal Component Analysis X_i; Income; and Vegetable Purchase Frequency. Since Age and Income are highly correlated (Table 7), regression analysis was done separately for Income and Age as independent variables, otherwise, there will be a collinearity phenomenon.

Table 7. Pearson correlation analysis

		Income	**Age**
Income	Sig. (2-tailed)		0.000
	N	301	301
	Pearson correlation	1	-0.671**
Age	Sig. (2-tailed)	0.000	
	N	301	301
	Pearson correlation	-0.671**	1

Source: Data analysis by SPSS using survey data

The result of regression analysis showed that components X_i (i = 1; …;12), except for X_5 Awareness of VietGAP, Vegetable purchase frequency at everyday level, with Sig. (p-values) < 0.05, are statistically significant, with positive signs (the sign of coefficients), implying the rising intention if one has a habit of going shopping regularly at least once a day. While in the status of living with family, the coefficient is negative, meaning the reduction in intention. There is a significant positive influence with *Income*, whereas the list including *Age* figured out a significant negative influence. The estimated value, the Coef. in Table 9, of the Ordered Logit model's sign and significant level indicated the influence magnitude of independent variables on the dependent variables, the Odds ratio indicates how much one unit change in an independent variable will change the dependent variable Intention. The author picked those items with odds ratio greater than 2.00 to put into discussion, however, the way of explanation can apply to all the significant factors X_i.

In the case of *Age* as an independent variable, the model I in Table 9 suggests that a one-unit increase in *Appearance and Packaging* leads to 0.715 times in the ordered log-odds – the coef. value, thus 2.04 times – the odds value, more intention to buy, given that the other variables are constant, implying the positive change in VietGAP vegetable package, exterior, or consumers' positive outlook on those features will attract them to buy. A unit increase in Promotion of domestic products is expected to have 0.988 ordered log odds, thus 2.69 times more intention to buy, on the condition that all of the other variables in the model are stable, this explains consumers are more willing to buy if they percept VietGAP vegetables as domestic products.

The same holds for all the other nine components in the model. When traceability and Price evaluation of VietGAP vegetables increases by one unit, there are 1.75 and 2.09 times and the intention to buy VietGAP vegetables. Apparently, as in other studies on consumer behavior, price is frequently a determinant of intention to buy a product, and this study indicated the positive view on price over the overall product – VietGAP vegetable, will raise the desire to buy. Similarly shown by the model II in Table 9, one unit rise in Perceived behavioral control, Beliefs in production, Availability of products, and Health concerns, will cause 2.89, 2.28, 2.38, and 2.50 times more intention, respectively. Consumers are more likely to purchase VietGAP vegetables if they find it easy, and conveniently available to do so, if they have a decent understanding of production processes, or if they treat the

products as an agent that produces positive effects on healthcare. When consumers shop for vegetables daily, they are expected to have 6.26 times more intention to buy VietGAP products. However, if an individual is supposed to live with family or is under 25, one's intention is expected to be almost halved, to 0.56 or 0.48 times, respectively, meaning that people tend to have less intention to buy VietGAP products if they live with family members, or as they grow.

When analyzing *Income* as an independent variable, Table 9 Model II shows that a unit increase in *Promotion of domestic products*, the ordered log-odds is inclined to be 0.934, thus bringing on 2.54 times more intention to buy if all other variables remain unchanged. Likewise, one unit rise in *Perceived behavioral control*, *Beliefs in production*, *Availability of products*, and *Health concerns* will respectively lead to 2.83, 2.33, 2.34, and 2.50 times more intention. If an individual is supposed to live with family, that person's intention is expected to be almost halved to 0.53, provided that the other variables are changeless.

Consumers who shop for vegetables daily are expected to have 6.81 times more intention to buy VietGAP products. With a one million VND (approximately 41 USD) increase in *Income*, there will be about 1.12 times in the intention, slightly higher. This is consistent with other studies on consumer behavior, the more consumers can earn, the more likelihood that they will buy the products.

In general, there are eleven components and the variable of buying frequency at the everyday level, whose influences on the intention are positive. In terms of components' influence magnitude, it can be inferred that going shopping every day has the highest impact on one's intention, followed by *Perceived behavioral control*, *Promotion of domestic products*, *Health concerns*, *Availability*, and *Beliefs in production*.

On the other hand, with a negative sign on the estimate of living with family, it can be predicted that people living with family tend to have less intention to buy VietGAP vegetables. This might be due to the fact that in many households, the mother is not the only person who is responsible for buying, even though they are the core menu planner. Under many circumstances, other members like children will be requested to go shopping instead. Therefore, the respondents might be in these cases, and they might not be interested in what type of vegetables but what vegetables they should buy instead. Another possible reason behind this is due to the limited source of collected data. Since the survey was conducted through the internet, the respondents somehow share information and influence each other's living styles, therefore, they are somewhat not too different in terms of buying habits. Consistent with many past studies, the more income, the more intention consumers will possess (Ha et al. 2021).

Table 9. OLR result: Estimates processing (with Age/Income)

	Model I (Excluding Income)					**Model II (Excluding Age)**				
Goodness-of-Fit Test	Chi-Square		Df		Sig.	Chi-Square		df		Sig.
Pearson	1257.556		1173		.043	1201.755		1181		.331
Deviance	397.649		1173		1.000	390.599		1181		1.000
Pseudo R-Square	Cox and Snell		Nagelkerke		McFadden	Cox and Snell		Nagelkerke		McFadden
	.560		.634		.382	.574		.650		.397
	Coef.	Std. rror	Wald	Sig.	Odds	Coef.	Std. Error	Wald	Sig.	Odds
Dependent variable										
[INT = 1]	-8.221	1.097	56.128	.000		-7.118	1.059	45.162	.000	
[INT = 2]	-6.444	.824	61.229	.000		-5.371	.771	48.559	.000	
[INT = 3]	-2.897	.657	19.426	.000		-1.848	.590	9.820	.002	
[INT = 4]	1.901	.634	8.984	.003		3.097	.618	25.081	.000	
Independent variable										
X_1 Appearance and package	.715	.140	25.890	.000	2.04	.627	.143	19.343	.000	1.87
X_2 Promotion of domestic products	.988	.147	45.021	.000	2.69	.934	.149	39.283	.000	2.54
X_3 Traceability	.559	.139	16.264	.000	1.75	.477	.141	11.378	.001	1.61
X_4 Price evaluation	.737	.153	23.206	.000	2.09	.649	.153	17.903	.000	1.91
X_5 Awareness of VietGAP	.264	.139	3.609	.057	1.30	.257	.141	3.326	.068	1.29
X_6 Perceived behavioral control	1.060	.150	50.194	.000	2.89	1.042	.149	48.847	.000	2.83
X_7 Beliefs in production	.824	.151	29.588	.000	2.28	.848	.152	30.969	.000	2.33
X_8 Environmental concern	.440	.140	9.953	.002	1.55	.422	.142	8.855	.003	1.53
X_9 Attained Knowledge	.501	.137	13.370	.000	1.65	.471	.138	11.715	.001	1.60
X_{10} Availability	.865	.150	33.344	.000	2.38	.850	.151	31.749	.000	2.34
X_{11} Subjective norm	.498	.138	12.960	.000	1.65	.481	.140	11.759	.001	1.62
X_{12} Concern about health	.916	.149	37.862	.000	2.50	.917	.149	37.625	.000	2.50
VPF Every day	1.834	.410	19.970	.000	6.26	1.919	.418	21.057	.000	6.81
Live with family	-.580	.287	4.097	.043	0.56	-.637	.293	4.748	.029	0.53
Cook for family	.397	.307	1.671	.196	1.49	.329	.311	1.120	.290	1.39
Food purchase for family	-.225	.313	.516	.472	0.80	-.325	.319	1.039	.308	0.72
GAP purchase experience	-.179	.319	.313	.576	0.84	-.214	.327	.427	.513	0.81
Gender	.112	.275	.167	.683	1.12	.052	.280	.035	.853	1.05
Age	-.729	.345	4.453	.035	0.48					
Income (million VND)						0.109	0.29	13.619	.000	1.12

Source: Data analysis by SPSS using survey data

CONCLUSION

Consumers' intentions are determined by vegetable purchase frequency with positive influence, 11 latent factors, and income. The most influential factors in decreasing order are: vegetable purchasing frequency at every day, perceived behavioral control, promotion of domestic products, health concerns, availability and beliefs in production. However, the status of living together and being at a young age made reversed impacts. In addition, this study found awareness of VietGAP and other demographic features insignificant, and the rest of the latent factors do have effects on the change of intention, although these are not too impressive.

Based on what the paper finds out – the influencing factors, the influence tendency, and the intensity of the influence, the authors suggest a few solutions to improve the intention as follow: To increase Perceived behavioral control, organizing processes in the physical stores, like separating VietGAP vegetables from the others by designing a secluded corner, writing more details on the description boards, and improving the online webpage interface should be done. The printing of packages for better, more prominent, and readily recognizable certification labels needs improving as well. It is vital for the management officers of MARD to improve the image of farming techniques in VietGAP vegetables under the view of their eyes. How VietGAP vegetables are produced, the process, and the supervision, are advisable, too, so that consumers better understand the production and become confident in their behavior.

The government's objective to stimulate Vietnamese to consume Vietnamese products does have a positive influence, hence, giving more promotion for domestic products like local propaganda and photo contests are highly recommended.

Considering health and beliefs on the production positively relates to buying behavioral intention. In order to boost these, local agricultural offices need to further the VietGAP certificate image promotion to people. It can be done better through food programs, nutrition-related programs on television, and online shopping platforms' advertisements. By doing so, the recognition of VietGAP in consumers' eyes will rise. Moreover, the supervision of VietGAP vegetables should be enhanced by sending officers to vegetable-providing farms in order for fake labeling not to happen. Information stated on the label and information that can be traced via QR codes should be more explicit, complete, and trustworthy (for example, growing method, processed procedures, origin, and expiration date), this is very important to increase consumer confidence in the products they may buy.

ACKNOWLEDGEMENT

The authors would like to extend sincere appreciation to the Tokyo University of Agriculture, Graduate School Master Program Research Funds for financial support. In addition, acknowledgement is also given to professors at the Department of International Agribusiness Management of Tokyo University of Agriculture.

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