
Activity 1.4

This study forms part of the ACIAR Project AGB/2012/061

Improving smallholder farmer incomes through strategic market development in mango supply chains in southern Vietnam

Study: Mango consumer study in Hanoi and HCMC

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Summary

A consumer study was conducted in order to (i) identify mango consumption behaviour of consumers in Hanoi and Ho Chi Min City (HCMC); (ii) analyse consumer attitudes towards mangoes and mango purchasing; and (iii) investigate consumer preferences and willingness to pay (WTP) for mangoes. To achieve these objectives, data was employed from an online survey of 1105 respondents in Hanoi and HCMC, and statistical descriptive and regression methods were used to identify mango purchasing behaviour, attitudes and preferences.

Mangoes produced in Tien Giang and Dong Thap provinces supply fruit to Hanoi and HCMC. However, the distance between production and consumption locations impact the distribution, with a lower percentage of mangoes from Tien Giang and Dong Thap consumed in Hanoi compared to HCMC.

On average, 64 per cent of customers purchased 1-2 kg of mango per visit, while 30 per cent bought 2-3 kg of mango per visit. Around 66 per cent of respondents purchased mango at least once a week for home consumption, and 27 per cent bought mango more than twice a week. Furthermore, nearly 50 per cent sometimes purchased fresh mango for consumption outside of the home. These results indicate that mango is one of the most popular fresh fruits consumed in Vietnam.

In terms of mango preference characteristics, medium-sized mango (300-500 grams) was the most popular. In addition, mango taste, freshness, shelf life and zero preservatives were the most preferred characteristics. Consumers also considered mango with a sweet taste and less fibre as highly desirable. Trust in the health and safety of mangoes positively influenced consumer behaviour as well.

The results of the discrete choice experimental model for mango preference consumption revealed that a strong fragrant aroma is the most significant attribute in influencing mango consumers. Mango with yellow skin, along with a medium size, were generally more popular among consumers.

Compared to 'no indication of place of origin', both origin claims (sticker on mango and product label) indicated that product traceability is also an important attribute to mango consumers. Surprisingly, the analytical result revealed that price is not the most important attribute influencing purchase, in that consumers were willing to pay more for optimum quality and food safety standards (VietGAP). Furthermore, 'ready to eat' at the point of purchase is preferred to mangoes ready in 1-3 days or more.

The willingness to pay (WTP) online results showed that mango consumers were willing to pay a price premium of VND2,570 and VND9,130 per kg for yellow skin mango, compared to green skin and red skin mangoes, respectively. They were also willing to pay a price premium of VND2,280 and VND 4,760 per kg for 'ready to eat' mango, compared to mangoes ready in 1-2 days and in 3 days or more respectively. Mangoes containing a QR code were also paid a price premium of VND10,550/kg higher than 'no indication of place of origin'. Furthermore, VietGAP certification mangoes could obtain a higher premium price of VND20,200/kg compared to products without certification.

Based on the results of the descriptive and modelling analysis, a number of recommendations are provided in relation to the production, post-harvest, and marketing of the Vietnamese mangoes.

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1. Introduction

1.1. Background

Fruits and vegetables (F&V) are gaining a prominent role in Vietnam's agricultural exports. The sector increased its export value from US\$306 million in 2007 to US\$3.55 billion in 2017 – equivalent to a CAGR (compound annual growth rate) of 27% over the same period. Furthermore, the F&V sector's share in total agricultural export value has increased dramatically to around 10% in 2018. The F&V sector is forecast to significantly contribute to Vietnam's total agricultural export value target of US\$43 billion in 2019 (MARD, 2019). However, more than 80 per cent of F&V production is consumed within the domestic market. Therefore, understanding the behaviour of local mango consumers is crucial in increasing value and income to farmers, as well as other stakeholders in the chain.

In recent years, the mango sub-sector has developed rapidly. Mango production areas and outputs reached peaks of almost 100,000 ha and 800,000 tonnes respectively in 2018, with mango ranked second in terms of total production area. Although Vietnam's fruit processing is not yet fully matured, several modern processing factories have been built during the last three years under a government strategy focusing on stimulating investment in agriculture, and the fruit industry in particular.

In Vietnam, there is a significant gap in understanding consumer preferences around mango, compared to general F&V consumption. The literature highlights a difference in F&V consumer preferences between Hanoi and HCMC (SCAP, 2009) – with a preference towards safe vegetables in HCMC (Hoang & Nakayasu, 2006; My et al., 2017). This finding is also confirmed from food consumption and expenditure studies (GFAR, 2019). These studies lay the foundation for understanding consumer behaviour and preferences around F&V consumption in key urban markets in Vietnam.

The limited studies to date involving mango have shown that consumers in Hanoi were most concerned about freshness, taste/aroma, skin colour, shape, and flesh colour; while those in HCMC paid more attention to shape, freshness, taste and skin colour (SCAP, 2009). In 2018, the same preferences in terms of freshness and taste remained; while safety was found to be the main factor influencing household decisions to buy mangoes (GFAR, 2019).

Under the project AGB/2012/061, SCAP, Griffith University and The University of Adelaide conducted a study of mango consumption behaviour in order to better understand consumer preferences. The aim of this report is to examine segments of the mango market and provide scientific evidence of pro-poor agribusiness development opportunities for mango in southern Vietnam, particularly in the two largest cities of Hanoi and HCMC.

1.2. Study objectives

The overarching aim of this study is to analyse the mango consumption behaviour of consumers in Hanoi and HCMC to obtain an in-depth understanding of key issues, consumers' attitudes towards mango and mango purchase, consumers' preferences for mango attributes and their willingness to pay (WTP) for such attributes.

The specific objectives of this study entail:

1. Identifying mango consumption behaviour of consumers within the two largest cities of Vietnam: Hanoi and HCMC;
2. Analysing consumer attitudes towards mangoes and mango purchasing; and
3. Understanding consumer preferences for mango attributes and their willingness to pay (WTP) for such attributes.

2. Methodology

2.1. Data collection

In order to obtain the necessary data, a consumer survey was conducted in Hanoi and HCMC. An online survey was designed to collect information on Vietnam mango consumers (n~1000 participants) incorporating around 20 questions, designed by the research group. The information gathered includes the respondent's characteristics, food and fruit consumption, purchasing behaviour, consumption attitudes, and preferences for mango characteristics.

In order to conduct a discrete choice experiment (DCE) study, an evaluation of consumer preferences for a number of mango attributes was performed. Through previous literature reviews and expert consultation (i.e. mango scientists, marketing researchers, and industry stakeholders), seven attributes were identified and the scenario for the experiment was defined as follows.

Suppose you are buying FRESH MANGOES for consumption as a fruit from the store/marketplace where you often buy fruit. The quantity for purchase would be around 1 to 2 kgs. There are 8 groups of mango purchase options A and B with 2 types of mangoes. Please choose which type you are more likely to buy in each group? You may choose NOT TO BUY "neither of A or B", if none of the two types is appealing to you. The characteristics of mango are:

- *Colour — Green; yellow; blush*
- *Size — Small (less than 300g per fruit); medium (300-500g per fruit); large (more than 500g per fruit)*
- *Place of origin indication— no indication; a sticker on the fruit; indication on the product label; indication with a QR code for tracing*
- *Production certification— VietGAP certification; no certification*
- *Aroma— when ripe: no fragrance; subtle; fragrant*
- *Readiness— ready to eat at purchase; ready to eat in 1 to 2 days; ready to eat in 3 or more days*
- *Price per kg— VND20,000; VND30,000; VND40,000; VND50,000; VND60,000*

Once again, please treat this exercise seriously and as if YOU WERE ACTUALLY CONSIDERING MANGO PURCHASE IN-STORE!

The pictures are for illustrative purposes only for colour and size, other attributes such as origin, production certification, aroma, readiness, and price are presented in the table.

Figure 1 presents an example of a single choice exercise – each respondent was asked to complete eight different choice exercises.

Figure 1. An example of a single choice exercise

Choice set No.1	Colour	Size	Origin	Production	Aroma	Readiness	Price	Alt
	Yellow	More than 500g	Indication in the product label	VietGAP certification	Subtle	Ready to eat in 1-2 days	30	A <input type="checkbox"/>
	Green	300g - 500g	Indication by a sticker on the fruit	No certification	Fragrant	Ready to eat in 3 days or more	30	B <input type="checkbox"/>
		Neither of A or B <input type="checkbox"/>						

Source: Author's instrument

Based on the defined attributes and attribute levels, we employed an efficient design for discrete choice experiments using the modified Fedorov algorithm (Carlsson and Martinsson, 2003), which maximises the D-efficiency of the design.¹ A total of 32 choice tasks were generated and grouped into four blocks, with eight choice scenarios for each block. An option to opt-out, i.e. the option of “neither” alternative, was available to respondents during each choice task. In order to reduce the burden on respondents during the choice experiment, improve the efficiency, and prevent respondents from boredom, we randomly selected one block of eight choice sets for each respondent and displayed the eight choice tasks one at a time.

To facilitate the results, a professional Internet-based survey company - GMO Research - was engaged to provide the survey panel and collect data via the online survey. GMO utilised their own online survey portal along with partner survey portals to recruit participants. Once participants had successfully answered the screening questions, they continued on to complete the survey. Given the focus of the online survey was mango purchasing behaviour, the eligibility criteria were: (1) adults over the age of 18 (students over 18 but not earning an independent income were excluded); (2) having purchased fresh food and mangoes for domestic consumption within the last year; and (3) being sole or joint decision-makers for grocery shopping in the family. Quotas were also set by city, age and household income group, in order to recruit panellists who were representative of different age and income levels. The survey instrument is provided in Appendix 1.

As a result, 1,105 consumers were surveyed, and the analytical findings are provided within the following sections of this report.

¹ The design was implemented by ‘dcreate’ (Hole 2015) in Stata 15 SE.

2.2. Analysis methods

Both descriptive and regression methods were used to investigate the mango purchasing behaviour, attitudes, and preferences of Vietnamese urban consumers.

In general, consumers are a heterogeneous group and their preferences for mango attributes may also be heterogeneous. A common method of evaluating preference heterogeneity is the mixed logit model (Revelt and Train 1998), which was used to analyse the DCE data.² Consumers were assumed to maximise the utility derived from their mango purchasing decisions. We defined an underlying latent variable U_{njs}^* that denotes the utility function associated with consumer n choosing option $j \in T$ during choice tasks. Consumer n will choose alternative j so long as $U_{njs}^* > U_{nks}^* \forall k \neq j$. Indirect utility U_{njs}^* is not directly observed, what is observed is the actual utility maximizing choice U_{njs} , where

$$U_{njs} = \begin{cases} 1 & \text{if } U_{njs}^* = \max(U_{n1s}^*, U_{n2s}^*, U_{n3s}^*, \dots, U_{nKs}^*) \\ 0 & \text{Otherwise} \end{cases} \quad (1)$$

Following standard practice, the indirect utility was assumed linear, ensuring that marginal utility is strictly monotonic in the specified attributes and only one choice is selected. The utility of consumer n can be written as $U_{njs}^* = X'_{njs}\beta + \varepsilon_{njs}$, where X'_{njs} is a vector of characteristics of each choice for the j th alternative, β is a vector of individual-specific coefficients mapping attribute levels into utility, and ε_{njs} is a random term that is assumed to be independently and identically distributed. This stochastic component of utility implies that predictions cannot be made with certainty and captures unobserved variations in tastes, as well as errors in consumer perceptions and optimization.

Following Train (2009), the probability that respondent n chooses alternative j in choice task s is given by

$$\begin{aligned} Prob(U_{njs} = 1 | X'_{n1s}, X'_{n2s}, \dots, X'_{nKs}, \Lambda) \\ = \int \frac{\exp(X'_{njs}\beta)}{\sum_{k=1}^K \exp(X'_{nks}\beta)} f(\beta | \Lambda) d\beta \end{aligned} \quad (2)$$

where $X'_{njs}\beta$ are the attribute levels and the marginal utility parameters, and the vector Λ refers collectively to the parameters characterizing the distribution of the random parameters. The probability in Equation (2) can be approximated numerically through maximum simulated likelihood.

Coefficients obtained from the model represent a consumer's preferences or marginal utilities for the various attributes of mango. The vector of parameters defining preferences over the attributes can be interpreted as marginal utilities. The marginal rate of substitution of one attribute for the other is simply the ratio of the two marginal utilities. For our purposes, we initially specified the coefficients corresponding to the attributes to vary, taking a normal distribution, and the random coefficients independent. Subsequently, if the random effect (measured by the estimated standard deviation of the mean of the coefficient) for a particular attribute level was not statistically significant, only the mean parameter was kept and the mixed effect logit model was re-estimated. Ultimately this allows for the possibility of positive

² The estimation was implemented by 'mixlogit' (Hole 2007) in Stata 15 SE.

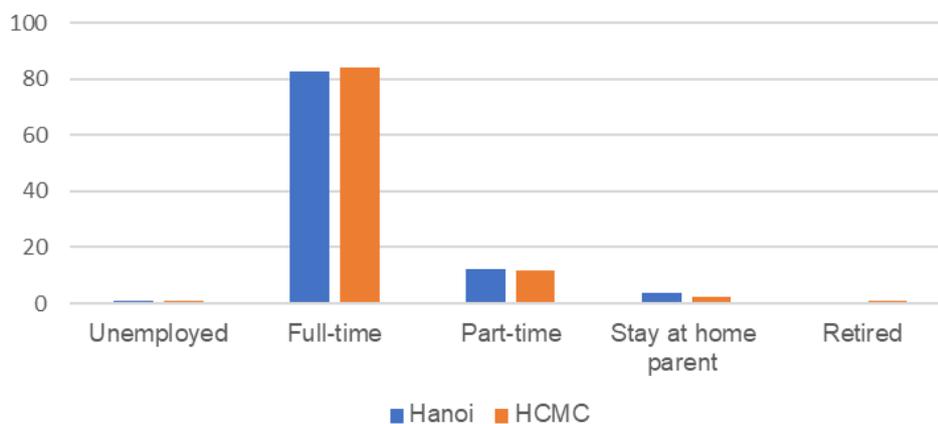
and negative preferences for certain mango attribute levels and a better understanding of consumer preference heterogeneity regarding these attribute levels.

3. Results

3.1. Respondent characteristics

There are 1,105 consumers who participated in the online survey. Among them, 584 participants (52.8%) are in Hanoi, with 521 participants (47.1%) living in HCMC. In both Hanoi and HCMC, the average age of respondents is around thirty-five years old; 34.5% are male, the remaining 65.5% female.

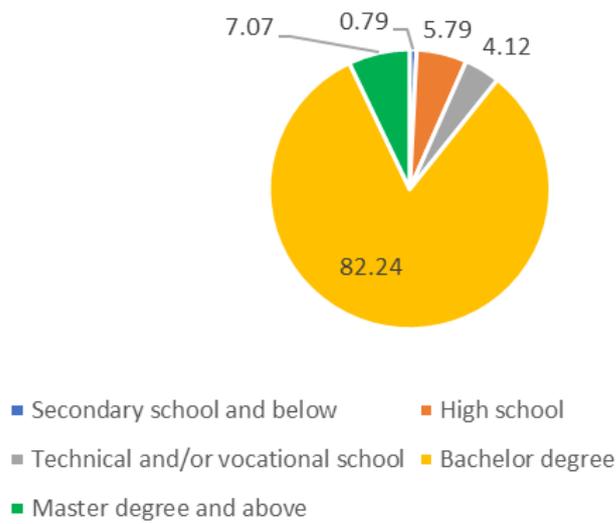
Figure 2. Current employment status of respondents in this survey



Source: Author's analysis

In terms of employment, the majority of respondents (more than 80%) have full-time employment (see Figure 2) and a *bachelor's degree* as the highest level of education (see Figure 3). While the mean years of schooling across the whole of Vietnam is 8.6 years (General Statistics Office of Vietnam, 2018), participants in this online survey have comparatively high education levels (82.2% have a bachelor's degree).

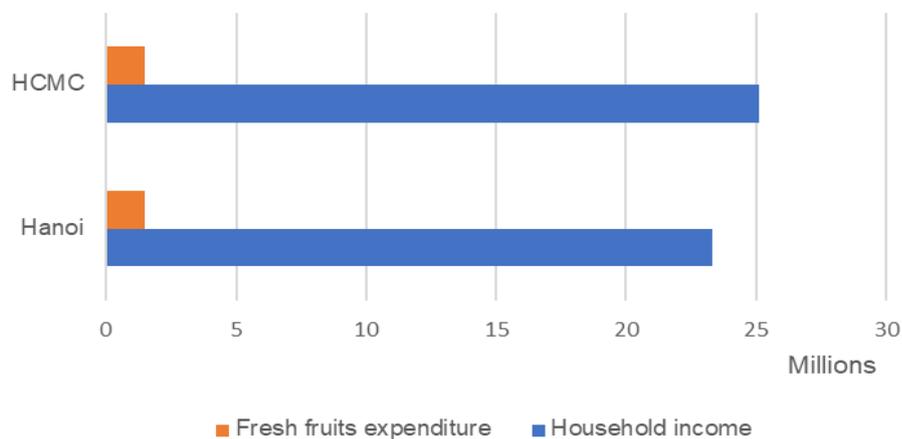
Figure 3. Respondents' highest level of education



Source: Author's analysis

On average, the household size of respondents is four members, and household monthly income (before tax) is VND24.16 million. Hence, the average income per capita in the survey is 6.04 million, which is comparable to the monthly average income of Hanoi and HCMC³ in the official survey of the General Statistical Office (GSO). However, household expenditure on fresh fruit is quite high – VND1.49 million per household per month – or 6.17% of household income. The average income and average fresh fruit expenditure of respondents in Hanoi are both slightly lower than respondents in HCMC (see Figure 4).

Figure 4. Monthly average household income and spending on fresh fruits in Hanoi and HCMC



Source: Author's analysis

³ According to data from the General Statistics Office of Vietnam, in 2018, monthly average income per capita of Hanoi is 6.054 million/person and HCMC is 6.177 million/person.

3.2 Mango purchasing behaviour and preferences

3.2.1. Distribution channels and mango origin

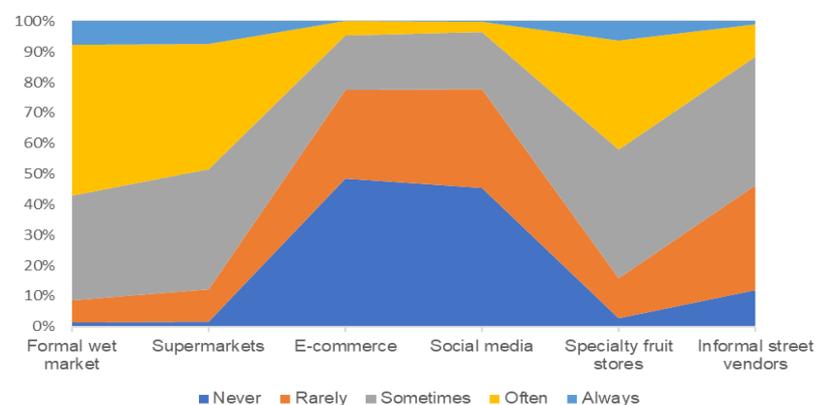
	Formal wet market		Supermarket		E-commerce		Social media		Specialty fruit store		Informal street vendor	
	Hanoi	HCMC	Hanoi	HCMC	Hanoi	HCMC	Hanoi	HCMC	Hanoi	HCMC	Hanoi	HCMC
Never %	1.33	2.24	1.7	0.81	48.48	50.51	45.45	45.21	2.65	2.65	11.93	10.79
	1.77		1.28		49.46		45.34		2.65		11.38	
Rarely %	7.2	7.74	10.42	8.96	28.98	28.11	32.39	32.79	13.26	12.83	34.28	33.81
	7.46		9.72		28.56		32.58		13.05		34.05	
Sometimes %	34.47	29.12	39.39	39.51	17.8	16.5	18.56	18.13	42.05	42.77	42.23	42.77
	31.89		39.45		17.17		18.35		42.39		42.49	
Often %	49.24	51.53	41.1	43.79	4.73	3.46	3.41	3.05	35.8	34.22	10.61	11
	50.34		42.39		4.12		3.24		35.03		10.79	
Always %	7.77	9.37	7.39	6.92	0	1.43	0.19	0.81	6.25	7.54	0.95	1.63
	8.54		7.16		0.69		0.49		6.87		1.28	
Trust score (7 scale)	4.31	4.24	5.21	5.16	2.79	2.77	2.75	2.79	4.78	4.72	3.45	3.42
	4.28		5.18		2.78		2.77		4.75		3.44	

Table 1: Channels to distribute mangoes to Hanoi and HCMC customers

Source: Author's analysis

The majority of customers in both Hanoi and HCMC buy mangoes from *supermarkets* and *wet markets*. *Specialty fruit store* is also the main channel to distribute fresh mango to customers. *Informal street vendor* is not as popular as these three channels, while *e-commerce* and *social media* are the least popular channels.

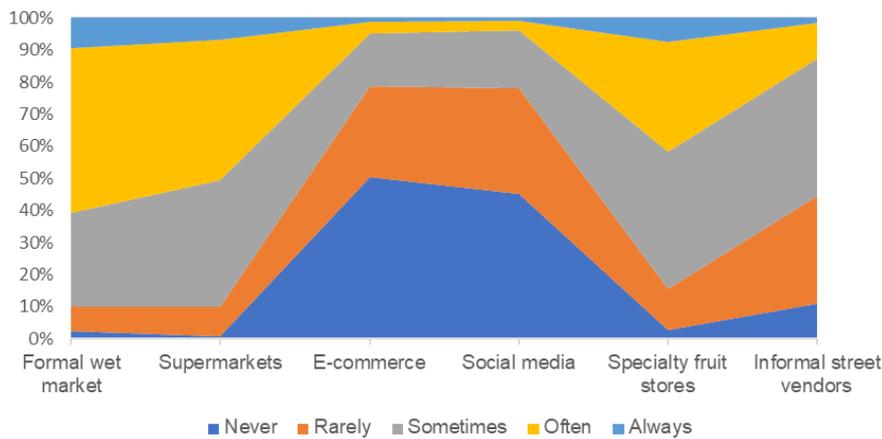
Figure 5. Mangoes distribution channels in Hanoi



Source: Author's analysis

Figure 5 and Figure 6 show similar retail choice trends across Hanoi and HCMC. Nearly 60% of Hanoi customers indicated that they “often” and “always” buy mangoes from wet markets; while in HCMC, this percentage is more than 60%. Similarly, nearly 50% of customers in both markets indicated that they “often” and “always” buy mangoes from supermarkets. More than 40% of respondents indicated that they “sometimes” buy mangoes from specialty fruit stores or informal street vendors, while nearly 50% of respondents said they “never” buy mangoes from e-commerce and social media. Possible reasons for this result are that when buying mangoes via e-commerce or social media, customers cannot choose mangoes directly, or that mangoes can be damaged due to physical contact during shipping.

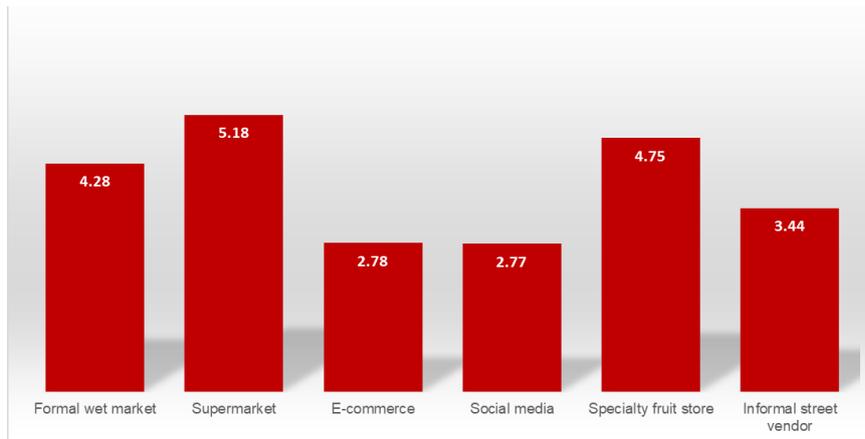
Figure 6. Mangoes distribution channels in HCMC



Source: Author's analysis

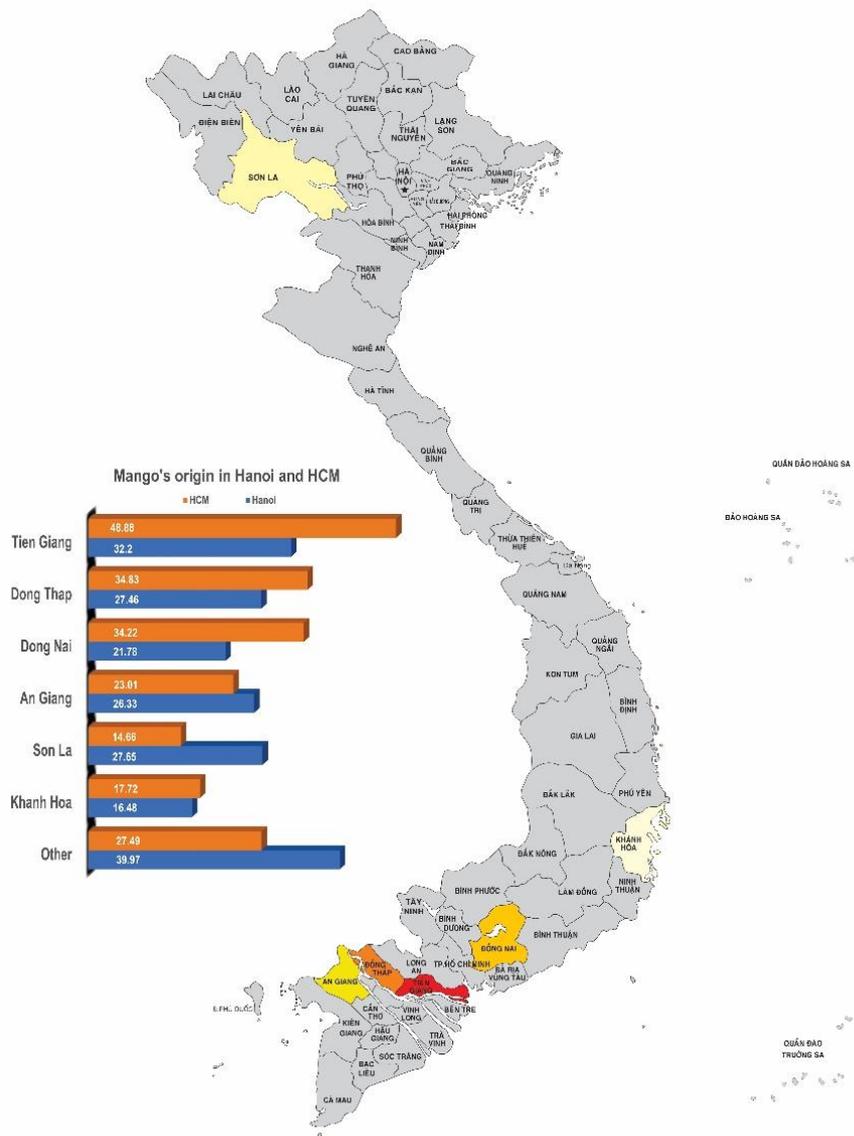
In terms of the *level of trust* (regarding retailer food safety level), on average, the supermarket enjoys the highest trust score (5.18 marks), followed by specialty fruit store (4.75 marks). Interestingly, the formal wet market has a reasonably high trust score (4.28 marks) while e-commerce and social media have the lowest trust levels (2.78 marks and 2.77 marks respectively) (see Figure 7).

Figure 7. Level of retailers' food safety trust



Source: Author's analysis

Figure 8. Mangoes' origin purchasing in the last 6 months



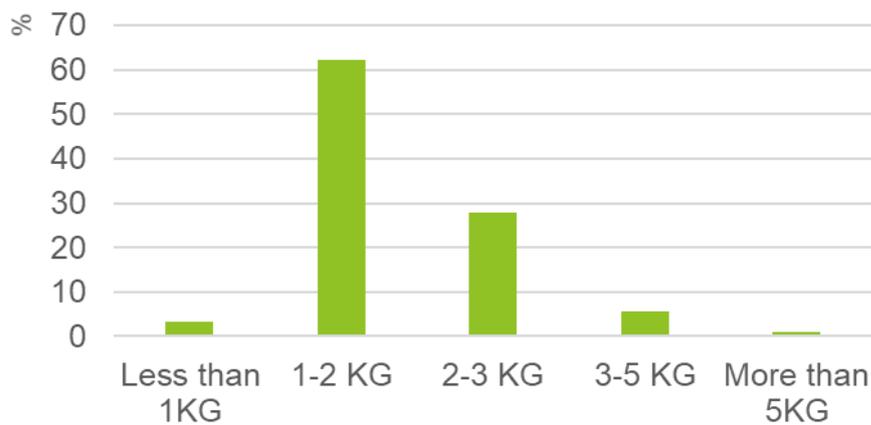
Source: Author's analysis

Figure 8 shows the origin of mangoes in Hanoi and HCMC. While nearly 20% of respondents do not know the origin of bought mangoes, the remaining 80% of respondents indicated that they buy mangoes from Tien Giang, Dong Thap, Dong Nai, An Giang, Khanh Hoa, Son La, and other provinces. Among them, Tien Giang and Dong Thap mangoes are the most popular. There is a slightly different pattern between Hanoi and HCMC regarding mango sources. This research reveals that southern provinces (such as Tien Giang, Dong Thap, and Dong Nai) provide more mangoes to the HCMC market than the Hanoi market. By contrast, Son La (a province in the north) supplies more mangoes to Hanoi than to HCMC.

3.2.2. Mango purchasing behaviour

The majority of participants indicated their most typical purchase of mangoes is between 1-2 kilograms (nearly 64%); while almost 30% of respondents usually buy 2-3 kilograms, and 5.2% between 3-5 kilograms. The numbers of customers who buy less than 1 kilogram or more than 5 kilograms of mangoes in this survey are negligible.

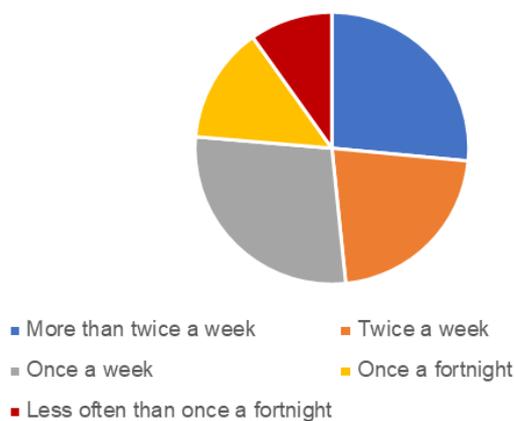
Figure 9. Average quantity of typical mango purchase



Source: Author's analysis

Figure 10 shows the frequency of fresh mango purchases for home consumption. Surprisingly, 26.5% of respondents indicated that they buy mangoes more than twice a week (this means mango probably is their most favourite fruit and their daily fruit consumption regularly includes mangoes) while 21.9% and 28.0% of respondents buy mango twice a week and once a week respectively. As displayed in Figure 11, more than two thirds of respondents from the online survey buy mangoes at least once a week for home consumption.

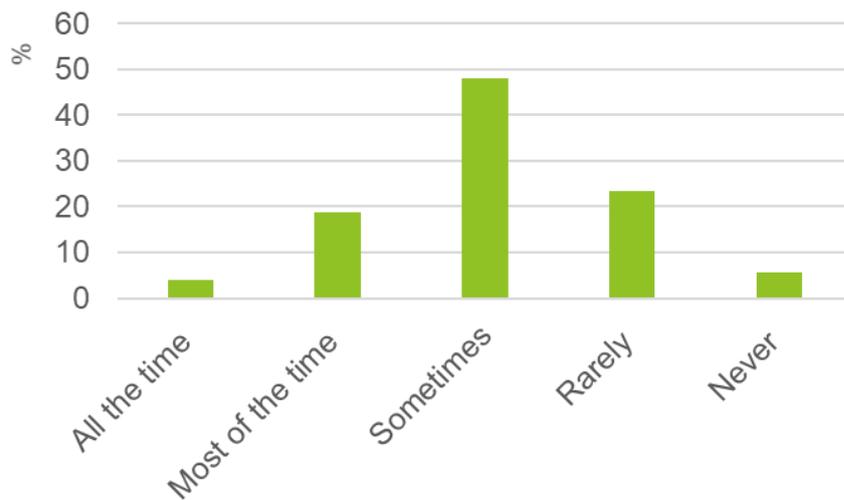
Figure 10. Fresh mango purchase for at-home-consumption



Source: Author's analysis

In addition to home consumption, nearly 50% of consumers *sometimes* buy fresh mango for *out-of-home consumption* (see Figure 11). More than 40% of respondents said they use mangoes for *gift-giving* purposes (see Figure 12).

Figure 11. Fresh mango purchase for out-of-home-consumption



Source: Author's analysis

After purchasing, mangoes are usually eaten as fresh fruit. The majority of respondents eat ripe-fresh mangoes (91.1%); and green-fresh mangoes (56.9%). Less than 20% of respondents use mangoes as an ingredient within a recipe.

Figure 12. The intended uses for the purchase of mangoes

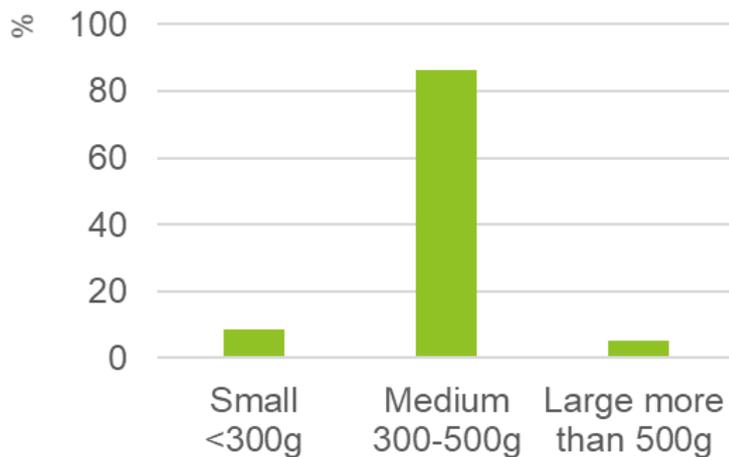


Source: Author's analysis

3.2.3. Mango preferences description

Medium size (between 300-500 grams) is the most preferred size among consumers, with 87% of respondents indicating that they prefer this size the most. Only 7.9% and 4.8% of consumers respectively prefer the small size (less than 300 grams) and large size (more than 500 grams).

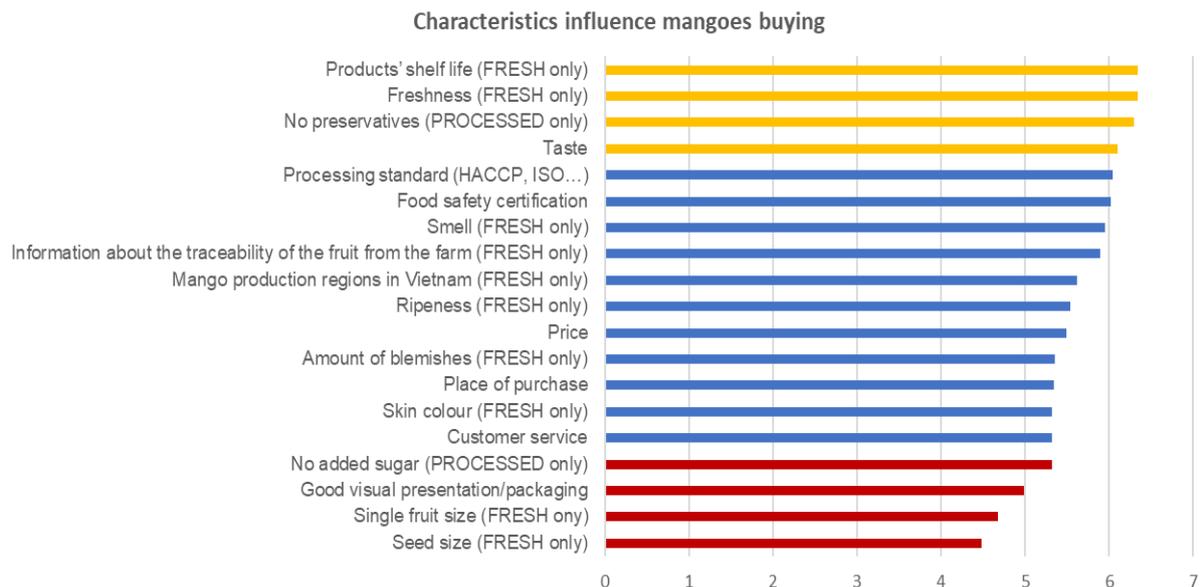
Figure 13. Mango size preference in Hanoi and HCMC



Source: Author's analysis

Another objective of the survey is to identify characteristics that influence customers when they buy fresh mangoes. Respondents were asked to rate 19 statements on a scale of 0 to 7 (0 being *not at all important* to 7 being *extremely important*). The results reveal that *products' shelf life, freshness, no preservatives, and taste* are the four most important characteristics (with average ratings of 6.34, 6.34, 6.29 and 6.10 respectively).

Figure 14. Characteristics influence customers when buying mangoes



Source: Author's analysis

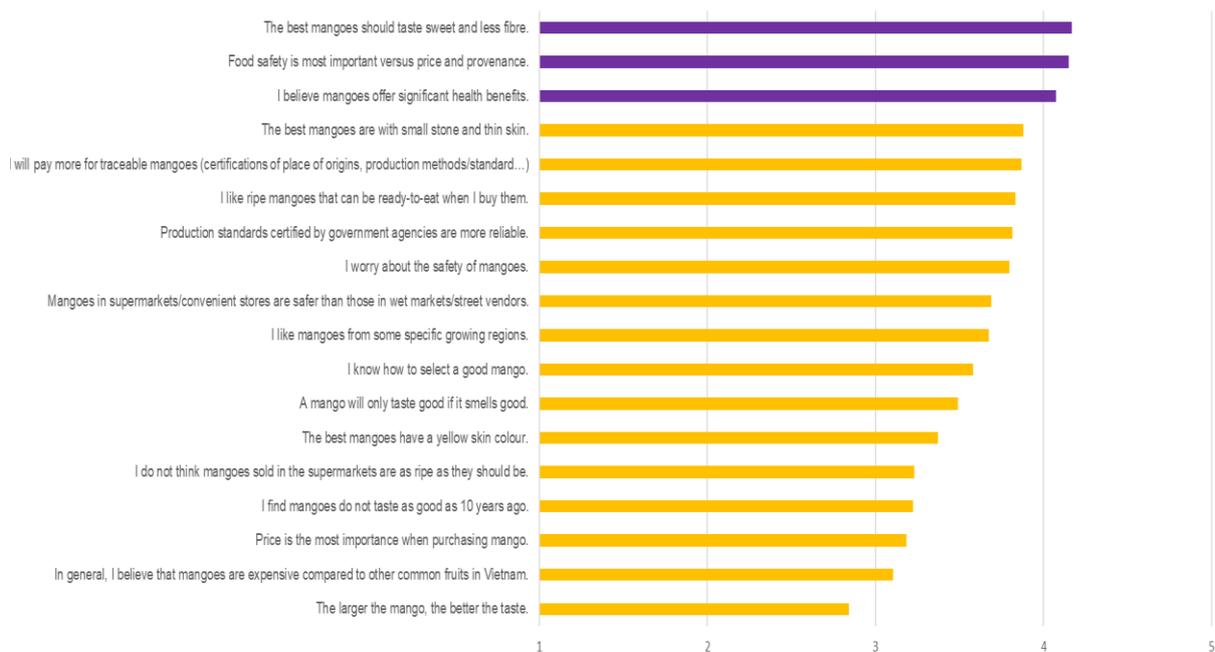
Compared to other factors, *no added sugar, good visual presentation/packaging, single fruit size and seed size* are the least important influence characteristics, with average ratings of 5.32, 4.98, 4.68 and 4.48 respectively (see Figure 14)⁴.

⁴ Figure 14 indicates “Fresh only” and “Processed only” within the characteristics, given a number of statements apply for fresh mango only – while others apply for processed mango only.

The online survey also provided respondents with a series of statements about mangoes and asked them to indicate how much they agree or disagree with each statement (1 = *strongly disagree*, 2 = *disagree*, 3 = *uncertain*, 4 = *agree*, and 5 = *strongly agree*).

“The best mangoes are taste sweet and less fibre”, “food safety is the most importance versus price and provenance”, and “I believe mangoes offer significant health benefit” are the three statements which obtained more than four scores on average – meaning nearly all respondents either *agree* or *strongly agree* with these three statements.

Figure 15. Statements about mangoes



Source: Author’s analysis

In addition to fresh mangoes, the survey also requested information about processed mango products. Respondents indicated that *mango drinks* are the most popular product with 871 respondents in this survey (or 78.8%) claiming to buy mango drinks. *Soft-dried mango* and *hard-dried mango* are the two next popular processed products – purchased by 69.9% customers and 62.6% customers respectively. In terms of mango origin, over 90% of respondents who bought processed mango products indicated that these products are produced domestically.

3.3 Modelling preferences for mango attributes using a discrete choice experiment

Results from the mixed logit estimation are displayed in Table 2. The coefficient on the strong fragrant aroma is 0.706, positive and significant at the 1% level in the mixed logit model with random parameters. Compared to no fragrance, the subtle aroma coefficient is 0.622 and not as important to consumers as the strong fragrant aroma attribute. The coefficient on big seed size is negative, as expected. The coefficient on the skin colour variable is large and significant, indicating that many respondents gain more utility and pay more attention to yellow and red skin compared to green skin. Yellow skin colour is valued by consumers approximately twice as much as subtle aroma. The coefficients are negative

for both small mango size and large mango size. Small size (<250g) is valued highly by consumers; however, the coefficients of large size (>400g) are approximately zero. The negative coefficients on mango size suggest that consumers prefer medium-size mango (not too small and not too big). As expected, the coefficient on place of origin is positive for both origin claims, namely sticker on mango and product label. Compared to 'no indication of origin claim', 'origin claim with indication on product label' and 'origin claim on a sticker on mango' are valued similarly by consumers. For price attribute, the coefficient is positive, small and not significant, which indicates that price is not the most important attribute influencing consumer purchase – according to the respondents involved in our online survey. While the role of price is not well supported, this is not unexpected, as most respondents have higher incomes (30% above average income) and are able to pay a higher price for high quality and food safety standards. Further, according to the random parameter standard deviations, there is significant preference heterogeneity for most of the attributes.

Results of the mean estimates of the coefficients suggested that respondents preferred mangoes with subtle aroma or fragrant mangoes compared to mangoes with no aroma. They did not prefer mangoes without any indication of place of origin. Ready to eat mangoes at point of purchase were also preferred to those ready in one to two days or in three days to more than three days. There was no statistical significance in preference between smaller mangoes (less than 300 grams) and medium-size mangoes (300-500 grams). These preferences were also homogenous across the respondents since their random components (S.D.) were dropped in the model. In addition, there are a number of attributes for which respondent preferences were heterogeneous. Although the mean estimates suggested that respondents preferred yellow skin mangoes to either green or red skin ones, this preference was only for 56%⁵ of respondents for green skin and 73% of respondents for red skin. Regarding place of origin indication, 88% of respondents preferred the QR code approach to no indication at all, while 12% preferred otherwise. There is preference heterogeneity for size since 26% of respondents preferred bigger mangoes to smaller ones, while 74% of respondents preferred otherwise. The majority of respondents (89%) preferred VietGAP certification to no production system certification.

Consistent with the law of demand, respondents prefer lower prices to higher prices. Comparisons between the price estimate and other attribute estimates produce the willingness to pay (WTP) for various attributes (see Table 3). For example, on average, yellow skin mangoes attract a price premium of VND2,570 and VND9,130 per kg compared to green skin mangoes and red skin mangoes, respectively. Ready to eat mangoes attract a price premium of VND2,280 and VND4,760 per kg respectively compared to mangoes ready in one to two days and mangoes ready in three days to more than three days. Place of origin indication attracts a relatively high price premium, with the QR code approach attracting up to VND10,550 per kg compared to no indication of place of origin. VietGAP certification mangoes are valued considerably higher than no certification mangoes, with the former having a price premium estimated at VND20,200 per kg.

⁵ This is computed by the cumulative distribution function (CDF) for the normal distribution (i.e. the area under the normal distribution from negative infinity to 0), given the mean and the standard deviation.

Table 2: Mixed logit model results for DCE

Attribute levels	Mean	Std. Err.	P> z	S.D.	Std. Err.	P> z
Price (in 1,000 VDN)	-0.071	0.027	0.01	N.S.		
Green (vs. yellow)	-0.183	0.062	0.00	1.172	0.079	0.00
Red (vs. yellow)	-0.648	0.060	0.00	1.041	0.080	0.00
Subtle aroma (vs. no smell)	0.604	0.052	0.00		N.S.	
Fragrant (vs. no smell)	0.644	0.055	0.00		N.S.	
Place of origin on label (vs. no indication)	0.489	0.070	0.00		N.S.	
Place of origin on a sticker on mango (vs. no indication)	0.542	0.066	0.00		N.S.	
Place of origin QR code (vs. no indication)	0.749	0.072	0.00	0.650	0.100	0.00
Ready to eat in 1 to 3 days (vs. ready at purchase)	-0.162	0.054	0.00		N.S.	
Ready to eat in more than 3 days (vs. ready at purchase)	-0.338	0.053	0.00		N.S.	
Size 300 to 500 grams (vs. smaller than 300 grams)	0.095	0.058	0.10		N.S.	
Size bigger than 500 grams (vs. smaller than 300 grams)	-0.269	0.051	0.00	0.426	0.099	0.00
VietGAP certification (vs. no certification)	1.435	0.072	0.00	1.168	0.068	0.00
Number of observations	15,136					
Number of respondents	946					
LR chi2 (df=5)	506.94 (p-value<0.001)					

Source: Author's analysis

Note: N.S.: Model pre-testing suggested standard deviations for these variables were not statistically significant. Therefore, in the final model, these variables were not specified as random.

Table 3. Willingness to pay (WTP) for various mango attributes calculated from the mixed logit model

	Mean WTP (VND1,000/kg)	95% confidence interval lower limit (VND1,000/kg)	95% confidence interval upper limit (VND1,000/kg)
Green (vs. yellow)	-2.57	-4.82	-0.32
Red (vs. yellow)	-9.13	-16.33	-1.92
Subtle aroma (vs. no smell)	8.50	1.92	15.07
Fragrant (vs. no smell)	9.07	2.67	15.47
Place of origin on the label (vs. no indication)	6.89	1.84	11.94
Place of origin on a sticker on mango (vs. no indication)	7.63	1.92	13.33
Place of origin QR code (vs. no indication)	10.55	3.45	17.64
Ready to eat in 1 to 3 days (vs. ready at purchase)	-2.28	-4.15	-0.42
Ready to eat in more than 3 days (vs. ready at purchase)	-4.76	-8.12	-1.39
Size 300 to 500 grams (vs. smaller than 300 grams)	1.33	-0.29	2.95
size bigger than 500 grams (vs. smaller than 300 grams)	-3.79	-6.76	-0.82
VietGAP certification (vs. no certification)	20.20	6.02	34.38

Source: Author's analysis

4. Recommendations

The results of the descriptive and modelling analysis of this consumer survey have established recommendations along the mango value chain based on three main stages: production, post-harvest and selling. Some recommendations are associated with a specific stage, while others can be applied to more than one stage or the whole chain.

- Mangoes are commercially classified in grades by the weight of the fruit. For example, grade 1 (premium) is larger than 500gram/mango, grade 2 is from 300gram – 500gram/ mango, grade 3 is less than 300gram/mango. This places a large price gap between grade 1, grade 2 and grade 3 mangoes. This research reveals that consumers prefer medium-size mangoes.
- The steep development of online enterprises as shopee, tiki, lazada, grabfood, gofood, nowdelivery, and other internet-based services shows that e-commerce becomes a more and more popular distribution channel in all sectors. Data from the consumer survey finds that supermarkets, wet markets, and specialty fruit stores are the main fresh mango distribution channels. Vietnamese consumers do not buy mangoes online as they are available in abundance locally.
- The results of the DCE model also show that a strong fragrant aroma is one of the most significant attributes in influencing mango consumers; mangoes with a sweet taste and less fibre are highly desirable. These findings confirmed that *the quality of mango* plays an important role for consumers. Hence, long-term policies should encourage crop scientists to develop new varieties or to improve the current planting method and motivate (train and support) mango farmers to produce fragrant aroma, sweet taste, less fibre, and small seed mangoes.
- Besides the appearance and quality characteristics mentioned above, consumers from the two cities also care about food safety of mangoes. Their concerns are illustrated by findings from the research -- *consumers are willing to pay more for food safety standard mangoes (VietGAP certification mangoes could obtain a higher premium price of VND20,200 per kg compared to those without a VietGAP certification), zero preservative is one of the most preferred characteristics, and consumers are willing to pay more for mangoes with sticker/product label on them, which could be used for product tracing*. Therefore, if actors in the mango value chain seek to target the high-income customers in HCMC and Hanoi, they should promote production certification such as VietGAP and enable traceability for their mangoes.
- One of the most important findings of the research is that *'ready to eat' at the point of purchase is preferred to mangoes ready in 1 day to 2 days or in 3 days or more* (this may be similar to the finding -- *yellow skin mango is preferred than green skin mango since the colour yellow usually indicates ripeness*). From the views of sellers, in order to narrow down the risks of damages that happened in transportation and packaging, they do not prefer selling ripe mangoes (ready to eat). In order words, selling *ready to eat* mangoes at stores may be challenging for value chain stakeholders at both the post-harvest stage and retail stage. However, there is an opportunity for the value chain to improve post-harvest practices, delivery and storage approaches to meet consumers' need for more ready-to-eat mangoes in store. Ready-to-eat can be one of the classification criteria and obtain a more premium price in retail outlets.

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6. Appendix

6.1. Consumer survey questionnaire

A. Online Survey Instructions

A1. Your age

--

[The survey stops if age is less than 18.]

A2. Your gender

	Male	Female

A3. Please choose which of the following applies to you (select only one):

- | |
|---|
| A. I am a fulltime student who is still dependent on my parents' income. |
| B. I am the only decision-maker in my family for everyday grocery purchases. |
| C. I am the main decision-maker in my family for everyday grocery purchases. |
| D. I sometimes make decisions regarding my family's everyday grocery purchases. |
| E. I don't make any decisions regarding my family's everyday grocery purchases. |

If A or E is selected in A3, the survey stops.

A4a. What food have you previously purchased for your family or self in the last 6 months? (Multiple choices)

Fresh fruit	<i>If Fresh Fruit or Dried Fruit is not selected, stops the interview</i>
Dried fruit	<i>If Fresh Fruit or Dried Fruit is not selected, stops the interview</i>
Fresh vegetables	
Snack/chocolate	
Dairy products	
Drinks	
Meal replacements	
Grains	
Oil, salt, sauce, etc.	
Nuts	
Fast food products	
Wines	
Sweets	
Others	

A4b. What fruit have you previously purchased for your family or self in the last 6 months? (Multiple choices)

Mango (including processed mangoes)	<i>If this answer is not selected, stops the interview</i>	Oranges	
Mangosteen		Pomelo	
Dragon fruit		Durian	
Banana		Watermelon	

B. About you and your family

The following information is necessary for statistical analysis only and will be held entirely confidential.

B1. What is your current *EMPLOYMENT* status?

<input type="checkbox"/> Unemployed	<input type="checkbox"/> Full time	<input type="checkbox"/> Part-time	<input type="checkbox"/> Stay at home parent (housewife/ husband)	<input type="checkbox"/> Retired
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B2a. How many people are currently living with you in the same house and share their income/meal with you? _____ Person/s

B2b. If you are living with your family, please tell us who are they (besides yourself):

<input type="checkbox"/> Spouse	How many?	<input type="text"/>
<input type="checkbox"/> Children under 5	How many?	<input type="text"/>
<input type="checkbox"/> Children between 6 and 12	How many?	<input type="text"/>
<input type="checkbox"/> Children above 13	How many?	<input type="text"/>
<input type="checkbox"/> Parents, parents-in-law,	How many?	<input type="text"/>
<input type="checkbox"/> Other, please specify:		<input type="text"/>

B3. Your highest level of education:

Primary school and below Secondary school High school
 Technical and/or vocational school Bachelor degree Master degree and above

B4. On average, how much is your household before-tax income (Vietnam Dong) per month?
 _____ Thousand VND

B5. In total, how much does your household typically spend on fresh fruits in a month? _____
 (Thousand VND per month)

C. Mango purchase and consumption

C1. Where do you currently buy the majority of your fruit and mango from? And please rank the following outlets in terms of the level of trust you have regarding its food safety level (i.e. the products are safe or having production certification). 7th being trust most and 1st being trust least.

	Fresh Mango	Trust
Formal Wet Markets	<input type="checkbox"/>	
Supermarkets	<input type="checkbox"/>	
E-commerce	<input type="checkbox"/>	
Social media	<input type="checkbox"/>	
Specialty fruit store	<input type="checkbox"/>	
Informal street markets	<input type="checkbox"/>	
Street vendors	<input type="checkbox"/>	

C2. What processed products do you buy?

	Processed mangoes	Is this product domestically manufactured? Yes/No
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Soft dried	<input type="checkbox"/>	
Hard dried	<input type="checkbox"/>	
Mango drinks	<input type="checkbox"/>	
Other	<input type="checkbox"/>	

C3. On a scale of 1 to 7 (1 being least important and 7 being extremely important) which of the following characteristics influence you when buying mangoes?

	0: Not at all important	1	2	3	4	5	6	7: Extremely important
For fresh mangoes								
Ripeness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Taste	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seed size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Single fruit size	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Freshness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Amount of blemishes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin colour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Price	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For processed mangoes								
No added sugar	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No preservatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Processing standard (HACCP, ISO...)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Products' shelf life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
For mangoes products in general								
Place of purchase	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mango production regions in Vietnam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food safety certification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Customer service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Good visual presentation/packaging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information about the traceability of the fruit from the farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C4. How often do you or your family purchase fresh mangoes?

More than twice a week	Twice a week	Once a week	Once a fortnight	Less often than once a fortnight
<input type="checkbox"/>				

C5. How often do you buy mangoes for out-of-home consumption?

All the time when I buy mangoes	Most of the time when I buy mangoes but not all	Sometimes when I buy mangoes	Rarely buy mangoes for out-of-home consumption	Never buy mangoes for out-of-home consumption
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C6. What is the intended use/s for the purchase of mangoes in your family (tick all that apply)?

Eat as fresh fruit (green)	Eat as fresh fruit (ripe)	Give as a gift	Use with other ingredients in a recipe	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C7. Which of the following mango size do you prefer most?

Small	Medium	Large
<300g	300-500g	More than 500g
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C8. What is the average quantity of your typical mango purchase?

Less than 1KG	1-2KG	2-3KG	3-5KG	More than 5KG
<input type="checkbox"/>				

C9. In the past 6 months, did you or your family purchase mango **produced in** the following provinces (select all that apply)?

Tien Giang	Dong Thap	Ben Tre	An Giang	Dong Nai	Khanh Hoa	Other:	Don't know
<input type="checkbox"/>							

C10. Please tell us the reasons why you chose to purchase mangoes from the selected provinces of **B8 (One Province by One Province)?** (Select all that apply)

a. I trust the quality of mangoes produced in that province.	<input type="checkbox"/>
b. I believe mangoes produced in that province have a very high level of safety for consumers, being free of disease and chemical and biological contaminants.	<input type="checkbox"/>
c. I believe in the integrity of mangoes produced in that province.	<input type="checkbox"/>
d. Imported mango offer value for money compared to others of similar quality.	<input type="checkbox"/>
e. I just wanted to have a try.	<input type="checkbox"/>
f. My family/friend(s) recommended mangoes produced in that province to me.	<input type="checkbox"/>
g. I saw celebrities buying mangoes produced in that province.	<input type="checkbox"/>
h. My family likes eating mangoes produced in that province.	<input type="checkbox"/>
i. I am able to find a reliable retailer for the mangoes produced in that province I would like to buy	<input type="checkbox"/>
j. I believe mangoes produced in that province is good for gift	<input type="checkbox"/>

C11. Below are some statements about mangoes. Please indicate how much you agree or disagree with it.

Statements about mango	1	2	3	4	5
	Strongly disagree	disagree	uncertain	agree	Strongly agree

The best mangoes have a yellow skin colour	<input type="checkbox"/>				
The best mangoes are taste sweet and less fibre	<input type="checkbox"/>				
The best mangoes are with small stone and thin skin	<input type="checkbox"/>				
The larger the mango, the better the taste	<input type="checkbox"/>				
A mango will only taste good if it smells good	<input type="checkbox"/>				
I like mango from some specify origin places	<input type="checkbox"/>				
I worry about food safety of mango	<input type="checkbox"/>				
I know how to select a good mango	<input type="checkbox"/>				
I like ripen mangoes that can be ready-to-eat when I buy them	<input type="checkbox"/>				
I believe mangoes offer significant health benefit	<input type="checkbox"/>				
In general, I believe mangoes are expensive	<input type="checkbox"/>				
Food safety is the most importance versus price and provenance	<input type="checkbox"/>				
Price is the most important when purchasing mango	<input type="checkbox"/>				
I will pay more for traceable mangoes (certifications of place of origins, production methods/standard)	<input type="checkbox"/>				
Production standards certified by government agencies are more reliable	<input type="checkbox"/>				
Mangoes in supermarkets/convenient stores are safer than those in wet markets/street vendors	<input type="checkbox"/>				

D. Mango Choice Experiment using D-efficient design: Below are different kinds of mango products with 7 different attributes, if you are offered option A and B, please choose only one that you would like to buy the mango with these attributes. If you do not like any of the 2 suggested options, please choose “Neither of A nor B”. (Will divide the sample to 4 groups, will use mango pictures in each choice set when doing a survey)

Group 1

Choice set No.	Colour	Size	Origin	Production	Aroma	Readiness	Price	Alt
2	Yellow	More than 500g	Indication in the product label	VietGAP certification	Subtle	Ready to eat in 1-2days	30	A <input type="checkbox"/>
	Green	300g-500g	Indication by a sticker on the fruit	No certification	Fragrant	Ready to eat in 3 days or more	30	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							
3	Blush	300g-500g	Indication in the product label	No certification	Fragrant	Ready to eat in 1-2days	50	A <input type="checkbox"/>
	Green	More than 500g	Indication with a QR code for tracing	VietGAP certification	No fragrance	Ready to eat in 3 days or more	50	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							
6	Green	More than 500g	Indication by a sticker on the fruit	VietGAP certification	Fragrant	Ready to eat at purchase	20	A <input type="checkbox"/>
	Blush	Less than 300g	Indication with a QR code for tracing	No certification	Subtle	Ready to eat in 3 days or more	20	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							
7	Blush	More than 500g	Indication in the product label	VietGAP certification	No fragrance	Ready to eat in 3 days or more	40	A <input type="checkbox"/>
	Yellow	300g-500g	No indication	No certification	Fragrant	Ready to eat in 1-2days	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							
Choice set No.	Colour	Size	Origin	Production	Aroma	Readiness	Price	Alt

13	Yellow	More than 500g	Indication by a sticker on the fruit	No certification	No fragrance	Ready to eat in 1-2days	40	A <input type="checkbox"/>
	Green	Less than 300g	No indication	VietGAP certification	Fragrant	Ready to eat in 3 days or more	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

14	Green	300g-500g	Indication by a sticker on the fruit	No certification	Subtle	Ready to eat at purchase	60	A <input type="checkbox"/>
	Blush	More than 500g	No indication	No certification	Fragrant	Ready to eat in 3 days or more	60	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

26	Green	300g-500g	Indication with a QR code for tracing	No certification	No fragrance	Ready to eat at purchase	30	A <input type="checkbox"/>
	Yellow	Less than 300g	Indication by a sticker on the fruit	VietGAP certification	Fragrant	Ready to eat in 1-2days	30	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

28	Green	300g-500g	Indication in the product label	No certification	Fragrant	Ready to eat in 3 days or more	40	A <input type="checkbox"/>
	Yellow	Less than 300g	Indication by a sticker on the fruit	VietGAP certification	Subtle	Ready to eat at purchase	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

Group 2

Choice set No.	Colour	Size	Origin	Production	Aroma	Readiness	Price	Alt
5	Blush	Less than 300g	Indication with a QR code for tracing	No certification	Fragrant	Ready to eat in 1-2days	30	A <input type="checkbox"/>
	Yellow	300g-500g	No indication	VietGAP certification	No fragrance	Ready to eat in 3 days or more	30	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

9	Yellow	Less than 300g	Indication with a QR code for tracing	No certification	No fragrance	Ready to eat in 1-2days	20	A <input type="checkbox"/>
	Green	More than 500g	No indication	No certification	Subtle	Ready to eat at purchase	20	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

15	Green	Less than 300g	Indication by a sticker on the fruit	VietGAP certification	No fragrance	Ready to eat in 1-2days	20	A <input type="checkbox"/>
	Yellow	More than 500g	Indication in the product label	No certification	Subtle	Ready to eat at purchase	20	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

21	Green	Less than 300g	Indication in the product label	VietGAP certification	No fragrance	Ready to eat at purchase	30	A <input type="checkbox"/>
	Blush	300g-500g	Indication by a sticker on the fruit	No certification	Subtle	Ready to eat in 1-2days	30	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

Choice set No.	Colour	Size	Origin	Production	Aroma	Readiness	Price	Alt
23	Green	300g-500g	No indication	VietGAP certification	Subtle	Ready to eat in 1-2days	40	A <input type="checkbox"/>
	Yellow	More than 500g	Indication by a sticker on the fruit	No certification	No fragrance	Ready to eat in 3 days or more	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

24	Blush	Less than 300g	Indication with a QR code for tracing	No certification	Fragrant	Ready to eat at purchase	50	A <input type="checkbox"/>
	Yellow	More than 500g	No indication	VietGAP certification	Subtle	Ready to eat in 3 days or more	50	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

30	Blush	300g-500g	No indication	VietGAP certification	No fragrance	Ready to eat at purchase	40	A <input type="checkbox"/>
	Yellow	Less than 300g	Indication with a QR code for tracing	No certification	Fragrant	Ready to eat in 3 days or more	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

32	Blush	More than 500g	No indication	VietGAP certification	No fragrance	Ready to eat at purchase	60	A <input type="checkbox"/>
	Green	300g-500g	Indication in the product label	No certification	Subtle	Ready to eat in 3 days or more	60	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

Group 3

Choice set No.	Colour	Size	Origin	Production	Aroma	Readiness	Price	Alt
8	Blush	Less than 300g	No indication	VietGAP certification	No fragrance	Ready to eat in 1-2days	30	A <input type="checkbox"/>
	Yellow	300g-500g	Indication by a sticker on the fruit	No certification	Fragrant	Ready to eat at purchase	30	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

10	Yellow	More than 500g	Indication with a QR code for tracing	VietGAP certification	Fragrant	Ready to eat in 3 days or more	40	A <input type="checkbox"/>
	Blush	Less than 300g	Indication in the product label	No certification	Subtle	Ready to eat at purchase	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

11	Yellow	More than 500g	No indication	VietGAP certification	Fragrant	Ready to eat at purchase	40	A <input type="checkbox"/>
	Green	300g-500g	Indication with a QR code for tracing	No certification	Subtle	Ready to eat in 3 days or more	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

17	Green	More than 500g	Indication in the product label	VietGAP certification	Fragrant	Ready to eat in 1-2days	50	A <input type="checkbox"/>
	Blush	Less than 300g	Indication by a sticker on the fruit	No certification	No fragrance	Ready to eat at purchase	50	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

Choice set No.	Colour	Size	Origin	Production	Aroma	Readiness	Price	Alt
22	Green	300g-500g	Indication by a sticker on the fruit	VietGAP certification	No fragrance	Ready to eat in 3 days or more	50	A <input type="checkbox"/>
	Blush	More than 500g	No indication	No certification	Subtle	Ready to eat at purchase	50	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

25	Green	More than 500g	Indication with a QR code for tracing	VietGAP certification	Subtle	Ready to eat in 1-2days	60	A <input type="checkbox"/>
	Blush	300g-500g	Indication in the product label	No certification	Fragrant	Ready to eat in 3 days or more	60	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

27	Green	Less than 300g	No indication	VietGAP certification	No fragrance	Ready to eat in 1-2days	40	A <input type="checkbox"/>
	Blush	More than 500g	Indication with a QR code for tracing	VietGAP certification	Subtle	Ready to eat in 3 days or more	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

29	Yellow	Less than 300g	No indication	VietGAP certification	Subtle	Ready to eat in 3 days or more	60	A <input type="checkbox"/>
	Blush	More than 500g	Indication in the product label	No certification	No fragrance	Ready to eat in 1-2days	60	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

Group 4

Choice set No.	Colour	Size	Origin	Production	Aroma	Readiness	Price	Alt
1	Yellow	Less than 300g	Indication in the product label	No certification	Fragrant	Ready to eat at purchase	40	A <input type="checkbox"/>
	Blush	More than 500g	Indication by a sticker on the fruit	VietGAP certification	Subtle	Ready to eat in 1-2days	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

4	Blush	300g-500g	Indication with a QR code for tracing	No certification	Fragrant	Ready to eat at purchase	40	A <input type="checkbox"/>
	Yellow	Less than 300g	Indication in the product label	VietGAP certification	No fragrance	Ready to eat in 3 days or more	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

12	Green	More than 500g	No indication	No certification	No fragrance	Ready to eat in 1-2days	40	A <input type="checkbox"/>
	Blush	300g-500g	Indication with a QR code for tracing	VietGAP certification	Fragrant	Ready to eat at purchase	50	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

16	Yellow	300g-500g	Indication in the product label	VietGAP certification	Subtle	Ready to eat in 1-2days	20	A <input type="checkbox"/>
	Green	More than 500g	Indication with a QR code for tracing	No certification	Fragrant	Ready to eat at purchase	20	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

Choice set No.	Colour	Size	Origin	Production	Aroma	Readiness	Price	Alt
18	Yellow	300g-500g	Indication with a QR code for tracing	No certification	No fragrance	Ready to eat at purchase	20	A <input type="checkbox"/>
	Green	More than 500g	Indication by a sticker on the fruit	VietGAP certification	Fragrant	Ready to eat in 1-2days	20	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

19	Blush	300g-500g	No indication	No certification	No fragrance	Ready to eat in 3 days or more	30	A <input type="checkbox"/>
	Green	Less than 300g	Indication in the product label	VietGAP certification	Subtle	Ready to eat at purchase	30	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							
20	Blush	300g-500g	Indication with a QR code for tracing	VietGAP certification	Fragrant	Ready to eat at purchase	50	A <input type="checkbox"/>
	Green	More than 500g	No indication	No certification	Subtle	Ready to eat in 3 days or more	40	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							
31	Blush	Less than 300g	Indication by a sticker on the fruit	VietGAP certification	Subtle	Ready to eat in 3 days or more	20	A <input type="checkbox"/>
	Yellow	300g-500g	Indication with a QR code for tracing	No certification	No fragrance	Ready to eat in 1-2days	20	B <input type="checkbox"/>
	Neither of A or B <input type="checkbox"/>							

E. Ending question

E1. If we will be conducting further interviews and case studies. Would you be willing to be contacted for further research in the future?

No

Yes

Mobile/Facebook/email:

Thank you for your assistance. We really appreciate you taking the time to participate in the survey.

End of survey