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A risk-benefit approach to the purchase and consumption of conventional vegetables in wet markets

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ABSTRACT

The purchase and consumption of conventional vegetables from wet markets in Vietnam are like two sides of a coin: perceived food safety risks and perceived benefits. Drawing on a sample of 463 Hanoi consumers, this study employed a risk-benefit approach to analyze the purchase intention and consumption frequency of conventional vegetables at traditional markets. A confirmatory factor analysis examined the links among risk perception, perceived utilitarian benefits, perceived hedonic benefits, and trust. Finally, generalized ordered and Poisson regressions were performed on these psychological constructs and their identified links. We found that perceived hedonic benefits, trust in wet market actors, and the presence of homegrown vegetables determined purchase intention and consumption frequency. The joint influence of perceived hedonic and utilitarian benefits on purchase intention implies that consumers considered both benefit dimensions when thinking of their future purchase of conventional vegetables. The significant interaction between perceived risk and perceived hedonic benefits on consumption frequency supports the risk-benefit approach. The effect of perceived hedonic benefits and income on purchase intention and consumption frequency are evidence of wet markets' social and cultural relevance.

1. Introduction

Like many other countries in Southeast Asia, Vietnam is increasingly facing challenges related to agrochemical management and the overuse of synthetic pesticides in vegetable production (Schreinemachers et al., 2020; Van Hoi et al., 2016). Rapid urbanization, population growth, and many small-scale actors within long food chains have challenged food safety governance, giving rise to uncertainties around the safety of perishable fresh foods supplied to metropolises. Pilot studies have revealed high pesticide and microbiological contamination levels in fresh vegetable samples sold in Vietnamese cities or grown in sub-urban areas (Nguyen et al., 2020; T. D. A.; Nguyen, Bui, et al., 2021). Unsurprisingly, consumers' concerns over vegetable safety remain consistently high despite many agricultural reforms (Ha et al., 2020).

In response, the Vietnamese government has promoted the expansion of supermarkets to improve food quality and safety through the provision of private food safety standards. The local governments expect that supermarkets with higher food safety assurance can replace wet markets. These traditional retail outlets are popular for fresh produce, but their food safety and hygiene have always been an issue (Wertheim-Heck et al., 2019). A series of modern food outlets like mini-markets, safe vegetable shops, and supermarkets are currently operating in Hanoi. Vegetables sold in supermarkets must have a certificate like organic and VietGAP or food safety claims to verify their safety status (Wertheim-Heck & Spaargaren, 2015). Consumers generally believe that vegetables at supermarkets are relatively safe compared to those at wet markets (Hansen, 2021).

However, despite policy makers' expectations, the traditional food retail (e.g., wet markets, mobile sellers) in Hanoi still dominates for fresh foods (Tran & Sirieix, 2020) even though it is facing intensified competition from supermarkets (Hansen, 2021). Wet market shopping is deeply embedded in the daily routine of many consumers, making it a cultural norm. Shopping for fresh vegetables at wet markets is preferred by many rural and urban residents due to several perceived instrumental

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values, such as shopping convenience, freshness, and low price (Ngo et al., 2019; Tran & Sirieix, 2020). Furthermore, consumers' attachment to wet markets is also attributable to their social values, such as social interactions between vegetable sellers and buyers (Wertheim-Heck & Spaargaren, 2015).

Notwithstanding, buying conventional vegetables from wet markets represents a risky choice for consumers from a food safety perspective. Vegetables traded at wet markets are not required to be certified as "safe", "VietGAP", or "Organic" and have labels showing the origin. Subsequently, most of the vegetables from this traditional retail outlet do not have safety certifications and traceability. They are mainly from conventional production, where food safety control is absent and farmers tend to overuse pesticides (Huong et al., 2013). While the food safety of conventional vegetables *per se* is not guaranteed, wet markets are also messy and unhygienic (Hansen, 2021), adding another layer to the health risks inherent in conventional vegetables. Data from national representative studies on contaminated vegetables at wet markets were unavailable. Nevertheless, a study in the Mekong delta shows that fresh vegetables at traditional markets are an important potential vehicle of Salmonella transmission to humans (Nguyen et al., 2021). According to Pham and Dinh (2020) 539 of 1050 vegetables (51%) sampled from Hanoi's traditional markets were contaminated with heavy metals and pesticides at levels surpassing the Maximum Residue Limit (MRL). At the provincial level, different public agencies are involved in food safety management at wet markets, but their roles are overlapped and their collaboration is weak. Limited resources challenge food safety enforcement, surveillance, and food safety education aimed at traders and farmers (Pham & Dinh, 2020; World Bank, 2017). In order to negotiate around the uncertainties of food safety, consumers have developed various risk-reducing strategies. These include avoiding produce from specific origins, buying from trusted vendors, and using personal experience to judge vegetable safety (Hansen, 2021).

With this background, this paper aims to investigate the determinants of purchase intention and consumption frequency of conventional vegetables at wet markets. We define conventional vegetables as those conventionally produced and traded without safety and quality labels and/or certifications and brands. In Vietnam, conventional vegetables are distinguished from vegetables that are branded and/or have safety or quality labels, including "safe", "VietGAP", and "organic" (Ngo et al., 2019). Food safety control is present in "VietGAP" and "organic" vegetable production but is missing in conventional vegetable production. We employ a risk-benefit approach (Blais & Weber, 2006; Weber et al., 2002) to analyze consumers' decision making under risk and uncertainty around food safety issues. According to the risk-benefit approach (Blais & Weber, 2006), the consumption decision would depend on consumers' risk preferences, which are domain-specific and presented as a function of the trade-off between what consumers think they will receive (perceived benefits) and what they will give up (perceived risks) when consuming this food. Consumers may recognize the safety risks inherent in conventional vegetables but still choose to purchase and consume these products when they place greater weight on the expected benefits. The approach has been used to analyze the acceptance of novel food like nanotechnology food (Siegrist et al., 2008), insect-based diets (Legendre & Baker, 2020), and street food (Choi et al., 2013).

The paper contributes to the existing research in two aspects. First, drawing upon the literature on food values (Maehle et al., 2015), the paper considers the perceived benefits of conventional vegetables as a multi-dimensional concept and decouples it into two dimensions, namely "hedonic" and "utilitarian". Perceived utilitarian benefits refer to consumers' overall evaluation of a product's instrumental functionality that consists of objective and task-oriented aspects such as low price, freshness, and high nutrition content. Hedonic benefitimplies emotional experiences like the pleasure or enjoyment gained from food taste (Ghali, 2020). Food consumption literature has documented that perception of both utilitarian and hedonic benefits can justify food choice to varying degrees (Ghali, 2020; Nystrand & Olsen, 2020). By decoupling the perceived benefits of conventional vegetables into the two dimensions above, this paper compares the influence of these dimensions on a risky behaviour that has not been investigated in previous studies on the consumption of risky foods.

Second, this paper considers interlinks among trust, risk perception, perceived utilitarian benefits, perceived hedonic benefits and how these interlinks influence consumption choice under food safety risk. This way, the study avoids omitted variable bias (Fox et al., 2011). Until now, a stream of literature on risky food choices has mainly focused on the single relationship between perceived risks and perceived benefits (Siegrist et al., 2008) or perceived risk and trust (Hakim et al., 2020). Other studies by Zhang et al. (2018) and Legendre and Baker (2020) took a step further by investigating how trust indirectly influences the acceptance or purchase intention through perceived risk and overall benefit. This paper extends these two studies by considering the multiple relationships among trust, risk perception, and different components of benefit perception in analyzing purchase intention and consumption frequency of conventional vegetables. Finally, by focusing on conventional vegetables and wet markets that are popular across Southeast Asia, the paper brings new insight from this geographical context. Findings from this study are useful to support effective decision making in risk communication and food safety governance in the region.

2. Theoretical framework and hypothesis development

2.1. Risk perception and benefit perception

Risky behaviour is shaped by perceived risks and benefits (Slovic & Peters, 2006). According to the risk-benefit approach (Weber et al., 2002), being confronted with a risky choice, consumers will form their preferences for that choice by considering the trade-off between perceived risks and expected benefits from the choice. The preference is formed as a composite variable consisting of the sum of the two variables above. Note that this preference is domain-specific, meaning that a consumer might be risk-averse in one domain but a risk-taker in another domain (Weber et al., 2002). While perceived risks reduce the likelihood of making a risky choice, perceived benefits increase it (Weber et al., 2002). This is attributable to the negative association between the two. According to Slovic and Peters (2006), risk, as a feeling, influences the judgement of both risks and benefits. For instance, if a consumer's feelings toward conventional vegetables are favourable, he/she tends to perceive a low risk but a high benefit from the product, which subsequently facilitates the purchase and vice versa.

A food product may bring multiple benefits or values (Lusk & Briggeman, 2009). Since perceived food benefit/value is a complex issue (Lin et al., 2005), by treating perceived benefits as a multi-dimensional construct, as suggested by Sweeney and Soutar (2001), we could develop better understanding of consumers' attitude to the risky choices. Marketing literature categorizes food benefits into two components: perceived hedonic and perceived utilitarian benefits (Shih-Tse Wang, 2015). The former is relatively intangible, sensorial, and emotional, such as the pleasure gleaned from food's good taste and flavor (Pallas et al., 2014). In contrast, the latter is tangible and associated with efficiency and utility, like the low price and calorie content (Shih-Tse Wang, 2015). In Vietnam, the freshness of fresh foods can be categorized as a utilitarian benefit because it relates to the product's appearance and is perceived by consumers as a fundamental food attribute (Wertheim-Heck & Spaargaren, 2015). Food might contain both hedonic and utilitarian benefits, and both types of benefits facilitate food purchase (Lee & Yun, 2015). These authors found the utilitarian benefit's perception to have a greater effect on purchase intention of utilitarian-setting foods like vegetables.

There might be an association between perceived hedonic and utilitarian benefits of conventional vegetable consumption. According to Luchs et al. (2010), if a product is judged positively on a specific

attribute, this favourable attitude will translate into its other attributes due to the "halo effect". This is the case for conventional vegetables: if consumers acknowledge the utilitarian benefits of the produce, then hedonic benefits might be evaluated positively. For example, a favourable perception about the freshness of conventional vegetables (utilitarian benefits) might make vegetables highly enjoyable to eat (hedonic benefits). However, Luchs et al. (2010) pointed out that a desirable attribute can negatively affect the perception of other attributes in a product due to beliefs about the trade-off required in efficient markets. For conventional vegetables, low price (utilitarian benefits) might signal low product quality, leading to customers' decreased enjoyment in shopping and eating (hedonic benefits). This implies no clear direction for the association between perceived hedonic and utilitarian benefits of conventional vegetable consumption. Therefore, we allow a flexible association between the two benefit dimensions in our study. Based on the above literature, hypotheses H1 and H2 are stated:

H1. Perceived risk is negatively associated with a) perceived utilitarian benefits and b) perceived hedonic benefits of conventional vegetables.

H2. Perceived utilitarian benefits and perceived hedonic benefits of conventional vegetables are associated.

2.2. Trust and risk perception

Trust plays an important role in the consumption of foods that seem unsafe. Food safety is a credence attribute, making it challenging for consumers to observe and assess food safety directly even after consumption (Henson, 2003). To reduce the uncertainties around food safety and the complexity of food safety judgement, consumers have to rely on the trust placed on the food industry and regulators in charge of food safety management (Wu et al., 2021). An early study by Starr (1985) pointed out that consumers are likely to perceive high risk if they distrust the capacity of respective authorities to control food safety efficiently. Worldwide evidence shows that the distrust in the food industry and the government is associated with consumers' decreased confidence in food safety (Wu et al., 2017), heightened risk perception, and hindered food purchase (Hakim et al., 2020). This evidence implies a relationship between trust and risk perception, and such a relationship influences food choice under risk. Accordingly, hypothesis H3 is proposed:

H3. There is a negative relationship between trust in actors at wet markets and risk perception of conventional vegetables.

2.3. Trust and benefit perception

Studies on the acceptance of genetically modified food (GMO) assert that trust plays a vital role in driving both risk and benefit perception of the food (Rodríguez-Entrena et al., 2013). For instance, trust in institutions and the food industry increased the perceived benefits of GMO products and decreased the perceived risk, increasing the likelihood of their acceptance (Rodríguez-Entrena et al., 2013). The same argument can be used for conventional vegetables at wet markets in Vietnam. Trust in actors at wet markets might lead to a positive evaluation of conventional vegetables, facilitating the purchase and consumption. We, therefore, propose that:

H4. There is an association between trust and a) perceived utilitarian benefits and b) perceived hedonic benefits of conventional vegetables.

We proposed the two hypothesized models for purchase intention and consumption frequency, respectively, based on the discussions above. Purchase intention (PI) and consumption frequency (CF) of conventional vegetables are assumed here as a function of four psychological constructs (risk perception, perceived hedonic benefits, perceived utilitarian benefits, and trust), five interactions among them, and socioeconomic and demographic characteristics. Previous literature shows that consumers with children perceived a higher food safety risk and were more risk averse in food choice (Nardi et al., 2020). Therefore, we were interested in testing whether the interaction between risk perception and the presence of children influence purchase intention and consumption frequency of vegetables at wet markets.

2.4. Behaviour toward conventional vegetables

Fig. 1 presents the hypothesized models that underline how psychological drivers, their relationships and sociodemographic characteristics determine the purchase and consumption of conventional vegetables – the two dependent variables. A double-arrow curve represents an association between a pair of independent variables, while straight single arrow lines reflect the direct influence of each independent variable, which is a latent construct or the interaction between a pair of constructs or a single demographic variable on the dependent variables.

3. Material and method

3.1. Data collection

Hanoi, the capital of Vietnam, was selected to be the study area of this research. It is the second biggest city in Vietnam, with a population of about 8 million in 2019. The city has 12 urban districts and 17 rural districts with a total area of 3358 km^2. A high level of food safety concern over conventional vegetables and the dominance of wet markets provide an interesting context for this study.

A sample of 478 food shoppers was selected from one supermarket in an urban district and three wet markets from Hanoi's urban, semi-urban, and rural districts during June and July 2019. Since cross-shopping for food is widespread and wet markets remain a dominant retail outlet for fresh food in Hanoi (Tran & Sirieix, 2020), supermarket shoppers might also purchase food from wet markets.. Our survey shows that supermarket shoppers had a lower intention to purchase vegetables from wet markets (2.01 ± 0.74 versus 2.15 ± 0.82) and consumed these vegetables less frequently (7.21 ± 4.99, versus 7.83 ± 4.95) than wet market shoppers. However, the independent sample T test shows that such difference was not statistically significant (p = 0.056 and p = 1.86 for

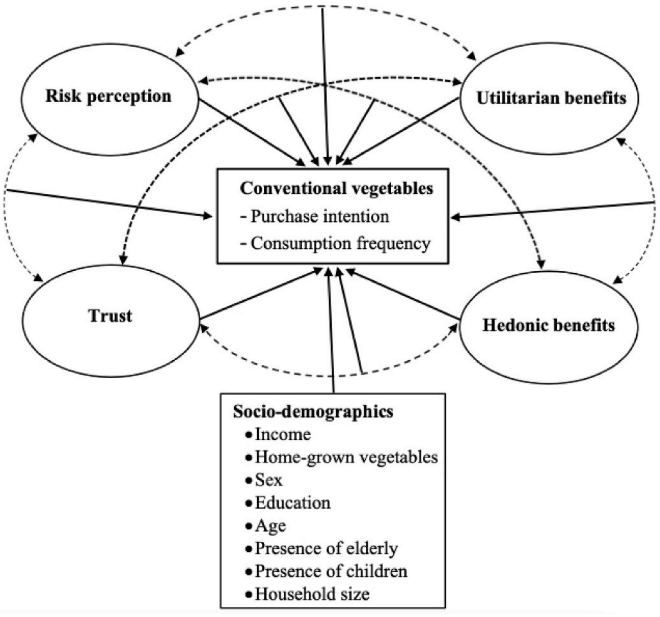

Fig. 1. Authors' conceptualization of the determinants of the purchase and consumption of conventional vegetables.

intention and purchase frequency, respectively). We observed that supermarket customers faced no difficulties in answering questions about conventional vegetables at wet markets since they are also familiar with wet market shopping and conventional vegetables.

We employed convenience sampling, as it was hard to achieve a random sample in a busy shopping environment. Shoppers who recently finished their food shopping were invited to participate in the survey. In the survey environment where respondents faced time constraints, for example, they had to go home quickly after food shopping, we designed a short questionnaire to limit the survey time to 10 minutes per respondent. After data cleaning, we removed 15 observations from the dataset due to missing variables and outliers. This left us with 463 useable observations for data analysis.

3.2. Scale development

3.2.1. Independent variables

We used three-question items to measure each construct: "risk perception", "trust", "utilitarian benefits", and "hedonic benefits". "Risk perception" captured the subjective evaluation of food safety risk, level of food safety worries, and health consequences of eating conventional vegetables. For "trust", respondents were asked to rate their trust level in the local government, farmers, and retailers at wet markets who are involved in food safety management of wet markets.

For "utilitarian benefits", respondents were asked to indicate their level of agreement with three attributes of conventional vegetables: cheapness, shopping convenience, and freshness. "Hedonic benefits" was measured by the following statements: "My family and I enjoy eating conventional vegetables from wet markets", "Eating conventional vegetable gives me pleasure", and "Buying and having conventional vegetables in daily meals fits my food culture and tradition" (Sweeney and Soutar (2001), Vu et al. (2015). We used a 10-point Likert scale for all items measuring latent constructs as it has been proven suitable for Vietnamese respondents in recent studies (Ha et al., 2020).

3.2.2. Control variables: Socioeconomic and demographic factors

Studies on risky food consumption show significant variations in the importance of sociodemographic factors in determining risky choices. In this study, eight socioeconomic demographic variables of our interest are age, biological sex, education, income, presence of children, elderly, household size, and homegrown vegetables. While the influence of age and biological sex may be highly context-specific, other socioeconomic variables tend to be more consistently related to the dependent variables in our study. For instance, compared to their older counterparts, young respondents are more likely to accept irradiated foods (Galati, Moavero, & Crescimanno, 2019) or eat undercooked fish and eggs (Kim et al., 2017); but they are more opposed to the consumption of game meat (Xie, Huang, Li, & Zhu, 2020). Likewise, biological sex plays a significant role in determining the acceptance of edible insects in a study by Orkusz, Wolańska, Harasym, Piwowar, and Kapelko (2020); but it was insignificant in Barton, Richardson, and McSweeney (2020). We argue that since conventional vegetables sold at wet markets are cheaper than in supermarkets (Evangelista et al., 2019), low-income consumers will consume them more frequently than consumers with mid-range incomes. Since the self-provisioning of vegetables has become a common strategy to assure vegetable safety among urban households (Ha et al., 2020), we argue that consumers who have homegrown vegetables will be less likely to buy and eat conventional vegetables.

3.2.3. Dependent variables

Purchase intention was measured using a single question "What is your likelihood of purchasing conventional vegetables at a wet market in the next 5 days?" Responses were recorded on a 10-point Likert scale, ranging from 1 (0–10% chance to buy) to 10 (over 90% chance to buy). This 10-point Likert scale was then transformed into a 3-point scale ranging from 1 (0–30% purchase likelihood), 2 (31–60% purchase likelihood) to 3 (more than 60% purchase likelihood) to allow a non-linear relationship between purchase intention and its predictors. "Consumption frequency" was measured as a count of the number of times a respondent consumes conventional vegetables per week.

3.3. Data characteristics

Table 1 presents descriptive statistics of the 12 observed variables measuring latent constructs, the eight control variables, and the two independent variables. Noticeably, trust in all stakeholders at wet markets is low, particularly trust in retailers (mean score = 2.45 out of 10). Perceived utilitarian benefits of conventional vegetables were rated higher than perceived.

hedonic benefits. Scores for perceived risk were relatively high but still slightly lower than perceived utilitarian benefits. Since food shopping is mainly women's responsibility in developing countries, female respondents were overrepresented in the sample (82%). 64% of surveyed shoppers had at least one child under 12 years old, and 60% had homegrown vegetables.

The correlation matrix for the 12 observed variables from four latent constructs is presented in Table 2. Family enjoyment and individual enjoyment exhibit the highest Pearson correlation coefficient (0.793). This is as expected because these two items are used to measure the same construct (hedonic benefits).

3.4. Data analysis

Data analysis was conducted in two steps. In the first step,

Table 1
Descriptive statistics of variables.

Dependent variables	Mean or percentage	SD	Min	Max
Purchase intention (PI): % of respondents reported				
- Low	27.20	n/a	n/a	n/a
- Medium	37.80	n/a	n/a	n/a
- High	35.20	n/a	n/a	n/a
- Consumption frequency (CF)	7.52	4.98	0.00	21.00
Independent latent constructs				
Trust				
- Trust in local government	3.59	2.55	1.00	10.00
- Trust in local farmers	2.80	2.20	1.00	10.00
- Trust in retailers at wet market	2.45	1.88	1.00	10.00
Hedonic benefits (HB)				
- Family enjoyment	6.28	1.95	1.00	10.00
- Individual enjoyment	6.15	1.75	1.00	10.00
- Custom fit	7.11	2.57	1.00	10.00
Utilitarian benefits (UB)				
- Price	6.71	2.37	1.00	10.00
- Convenience	8.15	2.12	1.00	10.00
- Freshness	7.24	2.05	1.00	10.00
Risk perception (RP)				
- Worry	7.26	2.06	1.00	10.00
- Risk	6.95	1.90	1.00	10.00
- Health	6.83	1.96	1.00	10.00
Control variables				
- Age	41.95	12.61	23.00	84.00
- Sex (% of male respondents))	12.00	n/a	n/a	n/a
- Edu (education from 0 (no schooling) to 7 (postgraduates))	3.39	1.17	0.00	7.00
- Income (monthly household income in million VND)	8.87	5.70	0.50	45.00
- Child (% of respondents with at least one child in the family)	64.00	n/a	n/a	n/a
- Elderly (% of respondents having at least 1 elderly in family)	37.00	n/a	n/a	n/a
- HHSize (number of household members)	4.42	1.40	1.00	11.00
- GrowVeg (% of respondents having home-grown vegetables)	60.00	n/a	n/a	n/a

Note: 1 USD = 22700 VND on 4th January 2022. "n/a" denotes "not applicable"

Table 2
Correlation matrix of observed variables measuring latent constructs.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1	1											
2	.505**	1										
3	.396**	.698**	1									
4	.149**	.318**	.315**	1								
5	.144**	.287**	.308**	.793**	1							
6	.077	.100*	.091	.367**	.419**	1						
7	.017	−.030	−.063	.125**	.129**	.109*	1					
8	.044	−.019	−.065	.100*	.072	.161**	.536**	1				
9	.053	.015	−.011	.217**	.169**	.116*	.506**	.608**	1			
10	−.062	−.145**	−.173**	−.152**	−.173**	−.048	.047	.246**	.125**	1		
11	−.028	−.172**	−.190**	−.162**	−.186**	−.059	.107*	.268**	.163**	.776**	1	
12	−.002	−.122**	−.138**	−.127**	−.152**	−.042	.064	.199**	.140**	.689**	.736**	1

Note: ** two tailed significant at 0.01 level.
1 (trust in local government), 2 (trust farmers), 3 (trust retailer at wet market), 4 (family enjoyment), 5 (individual enjoyment), 6 (custom fit), 7 (low price), 8 (shopping convenience), 9 (freshness), 10 (worry), 11 (risk), 12 (health).

confirmatory factor analysis (CFA) using AMOS 27 was performed to test the first four hypotheses (H1-H4) due to its ability to confirm i) the relationship between a hypothesized latent construct and its observed measures and ii) theoretical links among latent constructs. In other words, CFA helps to reveal whether the data fit the hypothesized measurement model (Kline, 2015). Our measurement model contained four latent constructs (risk perception, utilitarian benefits, hedonic benefits, trust) and 12 reflective measures. According to Schreiber et al. (2006), conducting both pre-analysis and post-analysis for CFA is crucial.

Pre-analysis involves an evaluation of sample size since it affects the stability of the parameter estimates. In this study, the ratio of observations to parameter estimated is an acceptable 15.3 (Schreiber et al., 2006). Pre-analysis also included an assessment of three assumptions (univariate normality, multivariate normality, and multicollinearity). Multicollinearity was not an issue, as evidenced by the variance inflation factor being equal to or less than 3.0 for all observed measures (Hair et al., 2011). However, our data have non-normal distribution, as three out of 12 observed measurements have either the Skewness or Kurtosis value larger than 1 (Hair et al., 2017). We used the Asymptotically Distribution-Free (ADF) estimation method, which does not rely on the normal distribution assumption.

We assessed the goodness-of-fit, construct validity, and reliability of the model. We used standard fit indices comprising the Chi-Squared test, Root Mean Square Error of Approximation, Goodness of Fit Index, Adjusted Goodness of Fit Index, Comparative Fit Index, and standardized Root Mean Square Residual with the thresholds recommended by Hu and Bentler (1999). In addition, the validity and reliability of the four latent constructs were evaluated via Composite Reliability, Average Variance Extracted, and cross factor loading.

In the second step, we performed regression analyses to test H5 and H6 using STATA 17. Two dependent variables are purchase intention and consumption frequency. The independent variables consisted of the four latent constructs, their causal links revealed in the first step, and the sociodemographic variables. Note that factor scores of the four latent constructs estimated through CFA were incorporated in the regression analysis.

Ordered logit regression was employed to explain purchase intention with three outcomes (low, medium, and high). This regression relies on the proportional odd assumption, where independent variables are assumed to share a similar effect across the categories of dependent variables. The results of the Brant test show that some variables violate the assumption (more detail in the Result section). We, therefore, used partial Generalized ordered logit models that allow the consistency of some coefficients for all categories of the dependent variable, while others might differ (Williams, 2016). We performed gologit2 command in Stata with autofit option (Williams, 2016).

We employed Poisson regression, which is relevant for count data, to explain the consumption frequency. A hierarchical regression framework was employed, in which socioeconomic and demographic variables were regressed first, then four latent constructs and their identified relationships were added to the first regression model. This process reveals whether introducing these constructs in the later stage improves the predicting power of the regression model.

4. Results

4.1. The relationship among risk perception, perceived utilitarian benefits, perceived hedonic benefits, and trust

Fig. 2 visualizes the unstandardized estimate of the measurement model. The measurement model yielded a chi-square value of 52.341 with 48 degrees of freedom. The insignificant result of the chi-square test ($p = 0.278$) indicates a good model fit. All factor loadings of observed measures are significantly different from zero ($p < 0.001$, two-tailed), suggesting the existence of significant relationships between them and their underlying constructs. The covariance for "hedonic benefits" and "trust" is the highest, indicating a stronger association between the two constructs compared to other pairs of latent constructs. "Trust" and "utilitarian benefits" were weakly interlinked, as evidenced by a marginal covariance (- 0.5).

Table 3 presents the goodness of fit of the measurement model. The hypothesized model fits our data well since all fit indices were above the benchmarks suggested by Hu and Bentler (1999).

The measurement model demonstrates adequate validity and acceptable reliability. Convergent validity is established since all average variance extracted (AVE) values are higher than the acceptable standard of 0.5 (Hair et al., 2017) (see Table 4). The model yielded a good discriminant validity, as evidenced by no cross-factor loading (Table 5). Table 4 shows that Cronbach's alphas and composite reliability are larger than the threshold of 0.7, indicating internal consistency reliability. Ten factor loadings are larger than 0.7, and the remaining two (custom fit and trust local government) have relatively low factor loadings between 0.45 and 0.54. We retained these two because removing them did not improve the composite reliability of their corresponding latent constructs (Hair et al., 2017), and their factor loadings are still higher than the cut-off recommended by Howard (2016).

Table 6 presents the test results for hypotheses from H1 to H4. Significant covariance emerges between five pairs of latent constructs: 1) hedonic benefits and risk perception, 2) utilitarian benefits and risk perception, 3) hedonic benefits and utilitarian benefits, 4) risk perception and trust, and 5) hedonic benefits and trust. The first holds a negative correlation, indicating support for H1a. The second was found to be positive, rejecting H1b. The third and the fifth exhibit a positive correlation that confirms H2 and H4b. The negative association of the fourth provides support for H3. The largest correlation coefficient is

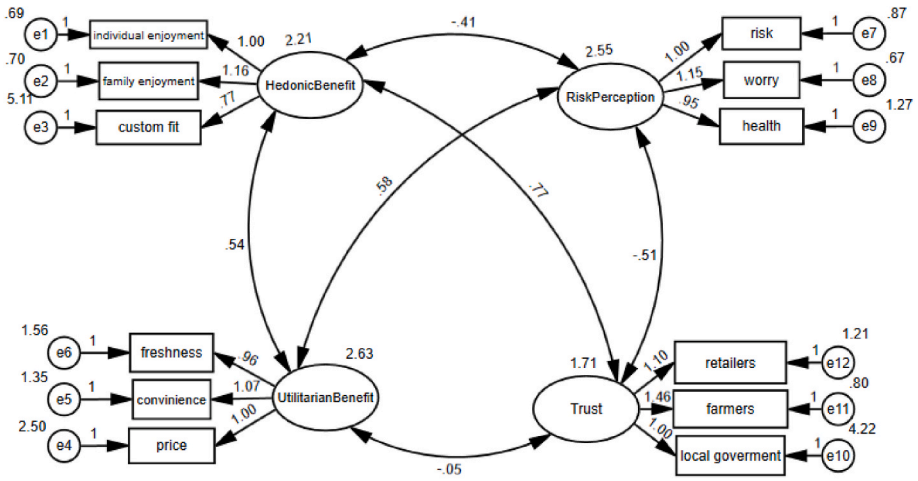

Fig. 2. Unstandardized estimate of the measurement model.

Table 3
Goodness of fit index of the measurement model.

Fit indices	Suggested threshold	Result of this study
Chi-square/df	<5	1.10
P value for the model	>.05	.278
CFI (Comparative Fit Index)	>.95 good	.991
GFI (Goodness of Fit Index)	>.95	.967
AGFI (Adjusted Goodness of Fit Index)	>.80	.947
SRMR (Standardized Root Mean Squared Residual)	<.09	.062
RMSEA (Root Mean Squared Error of Approximation)	<.05 good	.015

Table 4
Construct validity and reliability.

Latent constructs and reflecting measures	Factor loading	Cronbach's alpha	CR	AVE
Factor 1: Risk perception (RP)		0.892	0.896	0.742
Worry	0.913			
Risk	0.864			
Health	0.803			
Factor 2: Trust		0.759	0.800	0.581
Trust local government	0.537			
Trust farmers	0.906			
Trust retailer at wet market	0.796			
Factor 3: Hedonic benefits (HB)		0.769	0.802	0.592
Family enjoyment	0.872			
Individual enjoyment	0.901			
Custom fit	0.452			
Factor 4: Utilitarian benefits (UB)		0.786	0.819	0.603
Shopping convenience	0.830			
Freshness	0.779			
Low price	0.716			

Note: CR (Composite Reliability), AVE (Average Variance Extracted).

found for the fifth (hedonic benefits and trust, coefficient of 0.398).

4.2. Factors affecting the purchase intention and consumption frequency of conventional vegetables

Table 7 shows factors influencing the intention to purchase conventional vegetables in two models: 1A and 1B. 1A consists of only socioeconomic and demographic factors as independent variables, while 1B has socioeconomic demographics and latent constructs. Higher Pseudo R2 and Cragg-Uhler/Nagelkerke R2 were observed for model 1B, supporting this model.

Table 5
Factor correlation matrix.

Factors	RP	Trust	HB	UB
RP	1.000			
Trust	−.211	1.000		
HB	−.189	.379	1.000	
UB	.261	.181	−.033	1.000

Note: Extraction Method: Maximum Likelihood. Rotation Method: Promax with Kaiser Normalization, HB (perceived hedonic benefits), UB (perceived utilitarian benefits), RP (risk perception).

In model 1A, the variable age violated the proportional odd assumption ($p = 0.049$, Brant test) while in model 1B household income and perceived utilitarian benefits did not satisfy the same assumption ($p = 0.001$, $p = 0.026$, respectively). Therefore, the effect of the variables above differed across outcome categories (low, medium, high intention) within each model. Older consumers and those from higher-income households were less likely to have a high intention to buy conventional vegetables than the younger and those belonging to lower-income families. In contrast, respondents with higher perceived hedonic benefits were more likely to express a high purchase intention.

In both 1A and 1B, consumers who grow vegetables were likely to have a lower purchase intention. Larger household size was associated with a higher intention to buy conventional vegetables. Notably, 1B shows that hedonic benefits, trust, and the interaction between the two benefits components were significant predictors of purchase intention. The significant and positive interaction between perceived hedonic and utilitarian benefits implies that the greater the perceived utilitarian benefits are, the stronger the effect of hedonic benefits is on the intention. Surprisingly, a higher level of trust was associated with a lower intention to buy conventional vegetables.

Table 8 presents the determinants of consumption frequency of conventional vegetables. The effect of household income, education, household size, homegrown vegetables, children, and elderly in the household was significant in models 2A and 2B. When adding latent constructs and their interactions, the effect of age became significant in 2B. Hedonic benefits, trust, the interaction between hedonic benefits and risk perception, and the joint effect of risk perception and having children were significant predictors in model 2B. The significant and negative interaction between hedonic and risk perception implies that an increase in hedonic benefits would reduce the effect of risk perception on consumption frequency. Like the purchase model, including

Table 6
Result of hypothesis testing (H1 to H4).

Hypotheses	Covariance estimate				Correlation estimate	Hypothesis supported
	Cov.	S.E.	C.R.	P	Correlation coef.	
H1a:HB↔ RP	−.408	.133	−3.070	.002	−.172	Yes
H1b:UB ↔ RP	.580	.163	3.559	.000	.224	No
H2: HB ↔ UB	.539	.129	4.181	.000	.224	Yes
H3: RP ↔ Trust	−.512	.134	−3.820	.000	−.245	Yes
H4a:UB↔ Trust	−.049	.103	−.476	.634	−.023	No
H4b:HB↔Trust	.775	.123	6.304	.000	.398	Yes

Note: HB (perceived hedonic benefits), UB (perceived utilitarian benefits), RP (risk perception).

Table 7
Generalized ordered regression results: factors associated with purchase intention of conventional vegetables.

Variables	Model 1A (Sociodemographic variables only)		Model 1B (Socio-demographics + Latent constructs)	
	Low versus (Medium, High) Coef. (SE)	(Low, Medium) versus High Coef. (SE)	Low versus (Medium, High) Coef. (SE)	(Low, Medium) versus High Coef. (SE)
LnIncome	−.364** (.151)	−.364** (.151)	**−.107 (.205)**	**−.567*** (.186)**
VegGrow	−.600*** (.194)	−.600*** (.194)	−.520** (.208)	−.520** (.208)
Edu	−.067(.098)	−.067(.098)	−.143 (.105)	−.143 (.105)
Gend	−.240 (.266)	−.240(.266)	−.204 (.279)	−.204 (.279)
Age	**−.002(.010)**	**.017*(.010)**	.002 (.009)	.002 (.009)
Elderly	−.161(.213)	−.161(.213)	−.292 (.227)	−.292 (.227)
HHsize	.210*** (.077)	.210*** (.077)	.253** (.082)	.253** (.082)
Child	−.133(.235)	−.133(.235)	−.234 (.249)	−.234 (.249)
RPxChild			−.195 (.237)	−.195 (.237)
HB			.650*** (.121)	.650*** (.121)
UB			**−.048 (.139)**	**.743*** (.150)**
RP			−.107 (.211)	−.107 (.211)
Trust			−.249** (.121)	−.249** (.121)
HBxRP			−.008 (.134)	−.008 (.134)
HBxTrust			.054 (.120)	.054 (.120)
UBxRP			−.016 (.114)	−.016 (.114)
RPxTrust			−.111 (.117)	−.111 (.117)
HBxUB			.215* (.122)	.215* (.122)
_cons1	6.716*** (2.312)	6.716*** (2.312)	2.583 (3.139)	2.583 (3.139)
_cons2	4.21*** (2.301)	4.21*** (2.301)	7.99*** (2.863)	7.99*** (2.863)
Model fit				
Pseudo R2	.034	.121		
Cragg-Uhler/ Nagelkerke R2	.079	.260		

Note *: P < 0.1 **: P < 0.05 ***: P < 0.01.
HB = perceived hedonic benefits; RP = risk perception; UB = perceived utilitarian benefits; x (interaction between two variables). LnIncome (Ln of monthly family income), VegGrow (having homegrown vegetables, Edu (education) Elderly (having at least one elderly more than 65 years old in the family) HHsize (household size), Child (having at least one child less than 13 years old in the family), RPxChild: interaction between risk perception and children. The bold coefficients emphasize that the corresponding variables related to them violated the proportional odd assumption.

Table 8
Poisson regression results for factors associated with the consumption frequency of conventional vegetables.

	Model 2A (Socio-demographics only)	Model 2B (Sociodemographic and latent constructs)
LnIncome	−.098*** (.0138)	−.115***(.014)
VegGrow	−.503***(.037)	−.491***(.038)
Edu	−.035*(.018)	−.034*(.018)
Gend	.000(.053)	.023(.053)
Age	−.003(.002)	−.003*(.002)
Eld	−.172***(.042)	−.197***(.042)
HHsize	.068***(.015)	.068***(.015)
Child	−.081*(.046)	−.081*(.046)
RPxChild		−.131***(.043)
HB		.168***(.022)
UB		.004(.021)
RP		−.096**(.038)
Trust		−.057**(.023)
HBxRP		−.052**(.023)
HBxTrust		.019(.020)
UBxRP		.001(.019)
RPxTrust		.025(.020)
HBxUB		.018(.021)
_cons	3.935***(.250)	4.136*** (.260)
Model fit		
Pseudo R2	.071	.096
Cragg-Uhler/ Nagelkerke R2	.40	.50

Note:*: P < 0.1 **: P < 0.05 ***: P < 0.01.
HB = perceived hedonic benefits; RP = risk perception; UB = perceived utilitarian benefits; x (interaction between two variables). Lncome (Ln of monthly family income), VegGrow (having home grown vegetables, Edu (education), Eld (having at least one elderly more than 65 years old in the family) HHsize (household size), Child (having at least one child less than 13 years old in family), RPxChild: interaction between Risk perception and children.

latent constructs that are psychological predictors results in a more robust consumption model.

5. Discussion

5.1. Relationships among latent constructs

5.1.1. Perceived hedonic and utilitarian benefits of conventional vegetables

The results revealed a positive association between perceived hedonic and utilitarian benefits of conventional vegetables in wet markets. This finding confirms the existence of the "halo effect" (Luchs et al., 2010), in which a favourable attitude toward utilitarian benefits is shifted to the hedonic benefits of conventional vegetables. In the same vein, Seo and Lee (2021) find a high correlation between the two benefit components of street food consumption from CFA results, though the authors did not investigate this correlation. Since empirical studies that look into the relationship between perceived hedonic and utilitarian benefits of risky food choice is lacking, we call for more research focusing on this relationship.

5.1.2. Perceived hedonic benefits and trust

We found that consumers who hold a higher trust in local government, farmers, and food retailers at wet markets perceive better hedonic benefits of conventional vegetables and vice versa. This result aligns with Rodríguez-Entrena et al. (2013), who found that institutional trust increases the perceived benefits of genetically modified (GM) foods. The authors argued that such trust made consumers feel secure and well informed about the development of GM food and accordingly helped them form higher perceived benefits. In wet markets of Vietnam, trust is formed through personal relationships between sellers and buyers (Tran & Sirieix, 2020). This trust might reinforce higher perceived hedonic benefits that comprise good feelings when consuming conventional vegetables and the perception about social and cultural relevance of this product. However, the insignificant correlation between perception of utilitarian benefits and trust requires further investigation.

5.1.3. Perceived hedonic benefits and risk perception

The results revealed that the consumption and purchase of conventional vegetables at wet markets in Vietnam are associated with both perceived risks and benefits. On the one hand, the wet markets are especially questionable for food safety due to the lack of private standards (Hansen, 2021) and the weak enforcement of national food safety and hygiene requirements. On the other hand, shopping for fresh produce at wet markets fits with the daily shopping habit and social norms, such as the real-life interaction between sellers and buyers (Wertheim-Heck et al., 2014). As suggested by the risk-benefit approach (Blais & Weber, 2006), consumers make trade-offs between food safety risks and hedonic benefits of eating enjoyment, coupled with the social and cultural acceptance of wet market shopping. As expected, an increase in perceived hedonic benefits reduces the perceived risks from conventional vegetables. Surprisingly, we did not find an association between perceived utilitarian benefits and risk perception, even though vegetables are utilitarian-setting foods. Consumers who attach high utilitarian benefits to conventional vegetables might be those who "need" these vegetables more strongly, as opposed to consumers who attach high hedonic benefits to conventional produces. A lack of correlation between perceived utilitarian benefits and trust, as shown above, and between perceived utilitarian benefits and risk perception may simply mean that these consumers do not care much about food safety risks.

5.1.4. Risk perception and trust

In analogy with previous studies (Hakim et al., 2020), we found a negative relationship between risk perception and trust. Generally, levels of trust in local government, farmers, and retailers at wet markets were relatively low (Table 1), resulting in perceived high risk of conventional vegetables. In Vietnam, wet market shoppers can buy vegetables from either local farmers or vendors. Vegetable purchasers rely on "blind" trust when buying from local farmers (Wertheim-Heck & Spaargaren, 2015). Buyers believe that farmer sellers have ensured the safety of vegetable farming without visiting the farms or having knowledge about their production methods. Regarding trust in vendors at wet markets, consumers select vegetables from regular market vendors with whom they have established a long-term personal relationship. As such, trust in local farmers and/or vendors is a guarantee for food safety. If the trust has not yet been established, or the existing trust was eroded, consumers' risk perception tends to escalate.

5.1.5. Risk perception and perceived utilitarian benefits

The positive association between perceived utilitarian benefits and risk perception is a surprising result. A possible explanation derives from our investigation of how perceived utilitarian benefits is measured. The construct has three observed measures: low price, freshness, and shopping convenience. Freshness is an indicator of vegetable quality rather than food safety. Chemical contamination in vegetables is the top food safety concern (Ha et al., 2019), so vegetable freshness or shopping convenience is unrelated to such concerns. Worldwide evidence shows that price is a signal of food quality, with low price correlating with perceived low quality (Otter et al., 2018). Particularly in Vietnam, consumers view low prices as a cue for low food safety levels as they have observed considerable price differences between conventional vegetables at wet markets and vegetables with safety claims in supermarkets (Ngo et al., 2019). Therefore, we conclude that consumers who acknowledge the low-cost attribute of conventional vegetables would also view a high food safety risk embedded in the product.

5.2. Determinants of purchase intention and consumption frequency of conventional vegetables

The results revealed that hedonic benefits, trust, the presence of homegrown vegetables, and household size are determining factors of both purchase intention and consumption frequency of conventional vegetables. Of the two benefit dimensions, only hedonic benefits determined both the purchase intention and consumption frequency of conventional vegetables. This finding deviates from the findings of previous research that found that both benefit components influence food choice (Lee & Yun, 2015). Our finding might be attributable to the impact of "cultural context" concerning food preference, as Wansink, Sonka, and Cheney (2022) described. According to these authors, a high cultural context is common in Asia, emphasizing personal relationships and social interaction. The elements of cultural context are commonly involved in shopping for fresh food at wet markets in Vietnam. Personal relationships and social interaction between vegetable buyers and their regular sellers at wet markets (Wertheim-Heck et al., 2014) might form consumers' attachment to this retail outlet and their perceived hedonic benefits of fresh foods sold at traditional markets. This subsequently motivates the purchase and consumption of conventional fresh vegetables. We argue that the influence of hedonic benefits on the purchase and consumption of conventional vegetables is evidence of social and cultural values offered by wet markets in Vietnam.

Trust in stakeholders at wet markets significantly reduced purchase intention and consumption frequency of conventional vegetables. This result contradicts other studies in which trust positively influences perceived risky food purchases (Legendre & Baker, 2020). Research conducted in Vietnam indicated that food shopping at the wet market is based on the trust between shoppers and their regular farmer sellers or food retailers (Wertheim-Heck et al., 2014). The way we measure trust might be a reason for this finding. Trust, in this study, was operated by trust in food retailers at wet markets, local farmers, and the government. The term "local farmers" is generic, not accounting for those producing and selling vegetables at wet markets. Local government, which has limited control over food safety in wet markets, will be weakly related to wet markets. A better measurement of trust that explicitly emphasizes stakeholders at wet markets is needed to re-examine the sign of the trust construct.

As expected, consumers who grow vegetables had a lower intention of buying conventional alternatives and ate them less often than those who are not vegetable growers. In big cities in Vietnam, rural and urban households strive to produce vegetables to serve a part of household food needs, with the main motive being food safety concerns (Ha et al., 2019). As expected, the availability of homegrown vegetables perceived as superior in terms of food safety (Ha et al., 2019) has diminished the demand for conventional alternatives. Looking into the influence of homegrown vegetables, we considered the connection between individual consumption decisions and household production activity.

Purchase intention and consumption frequency of conventional vegetables were higher among consumers who belong to larger-sized households. Since the household size is positively correlated with price sensitivity (Van Doorn & Verhoef, 2011), larger households tend to go for low-cost foods, like conventional vegetables, to reduce their food expenditure. This directly influences the consumption of individual household members, particularly adults. Previous studies support these

arguments where the size of households was generally associated with increased consumption of conventional vegetables and a decreased consumption of organic alternatives (Aschemann-Witzel & Zielke, 2017Aschemann-Witzel & Zielke, 2017; Schröck, 2012).

In line with the previous literature on utilitarian foods (Lee & Yun, 2015), this study confirms the effect of both perceived utilitarian and hedonic benefits on purchase intention. Noticeably, they are important drivers of the intention to purchase conventional vegetables, as evidenced by their superior effect compared to remaining variables. Moreover, the joint influence of the two benefit components suggests that an increase in one component would improve the other, leading to a higher inclination to purchase. This finding provides another evidence to support the impact of "halo effect", as described by Luchs et al. (2010).

Unlike purchase intention, consumption frequency depends on hedonic benefits, risk perception and their interaction. Previous studies show the positive influence of perceived benefits and the negative effect of risk perception on risky food choices (Legendre & Baker, 2020; Olsen & Tuu, 2017). Similarly, we found that hedonic benefits motivated conventional vegetable consumption, whereas risk perception prevented the consumption. Moreover, the significant interaction between risk perception and hedonic benefits indicate that perception of hedonic benefits partially offsets perceived food safety risk. An increase in hedonic benefits would lower risk perception and increase conventional vegetables' consumption frequency. This finding supports the risk-benefit approach and highlights that consumers consider both risk and benefits in conventional vegetable consumption.

Interestingly, our findings indicate that risk perception influenced consumption frequency but not purchase intention. We argue that although food safety concerns exist in consumers' minds, these concerns are not their primary consideration when thinking of their future purchase of conventional vegetables. However, when they shop and consume conventional vegetables at wet markets, their direct exposure to the produce might urge them to consider its food safety risks. This explains why risk perception predicts consumption behaviour only.

Many demographic variables were significant predictors of consumption frequency. Older respondents and those with either elderly or children less frequently consume conventional vegetables. The joint effect of risk perception and children suggests that for consumers who have children, risk perception had a higher impact on consumption frequency. In other words, their risk perception caused a larger reduction in consumption frequency of conventional vegetables, as compared to those without children. Though risk perception was not statistically significantly different between respondents with and without children (risk perception $= 7.319 \pm 2.03$ versus 7.07 ± 2.14, $p = 0.269$), the risk averse attitude of those with children might explain the joint effect above. According to Nardi et al. (2020), food safety is perceived to be more important to shoppers whose household members include the elderly and/or children, who are more vulnerable to foodborne disease. Therefore, older consumers and those with elderly and/or children in their households would reduce the consumption of conventional vegetables to eliminate the perceived risk from the products.

Since vegetables at wet markets are relatively cheap (Evangelista et al., 2019), consumers from lower-income households have a higher purchase intention and are likely to consume conventional vegetables more frequently than those from higher-income households. This finding is supported by Wertheim-Heck et al. (2019), which emphasizes the social inclusiveness of wet markets in Vietnam. With the low price of fresh foods, traditional markets have enabled access to healthy foods among low-income urban households that are excluded from modern retail outlets. Consumers with lower education levels were more likely to consume conventional vegetables, and there was a positive association between education and income ($r = 0.27$, $p < 0.01$, two-tailed). This finding re-confirms that wet markets tend to be the market for low-income consumers, and conventional fresh foods seem to be the choice of the poor rather than the middle-income class.

6. Conclusions and practical implications

In Vietnam, fresh food shopping at wet markets is the most popular despite the associated food safety concerns. This provides an interesting context to examine the intention to purchase and the consumption behaviour of conventional vegetables at wet markets. In this study, we decoupled the perceived benefits of conventional vegetables into utilitarian and hedonic dimensions. We employed a risk-benefit approach to investigate the influence and relationships among risk perception, benefit perception, and trust on the purchase intention and the consumption frequency of conventional vegetables at wet markets.

Using confirmatory analysis, we found a significant relationship between five pairs of latent constructs comprising i) hedonic benefits and utilitarian benefits, ii) hedonic benefit and trust, iii) hedonic benefits and risk perception, iv) risk perception and utilitarian benefits, and v) risk perception and trust. This finding suggests that reducing consumers' worry over food safety would improve their trust in involved actors and increase the perceived hedonic benefits of conventional vegetables. Since perceived hedonic and utilitarian benefits are positively associated, improving utilitarian benefits, such as vegetable freshness, would increase hedonic benefits like eating enjoyment.

We found that consumers considered both utilitarian and hedonic benefits in purchase intentions and both of these two benefit components were key drivers of the intention. The significant interaction between the two benefit dimensions suggests that higher utilitarian benefits perceived would result in a better evaluation of the hedonic benefits of conventional vegetables, which in turn will stimulate purchase intention. Studies that have examined the effect of each benefit component on risky food choices are lacking. By investigating of utilitarian and hedonic benefits of conventional vegetables in wet markets of a developing country, this study has contributed to the existing literature on risky food choices.

This study confirms the relevance of the risk-benefit approach in explaining food choice under risks. We found the joint influence of perceived risks and perceived benefits on the consumption of conventional vegetables. While the perception of hedonic benefits could motivate consumption, the perception of food safety risk was a barrier to consumption. Perceived risks need to be reduced to address consumers' worries over food safety. Reducing perceived risk and increasing perceived hedonic benefits of conventional vegetables requires better risk communication and control over the safety of conventional foods in Vietnam.

We highlight the importance of cultural values offered by wet markets, evidenced by the influence of hedonic benefits on both the purchase intention and consumption frequency of conventional vegetables. The social inclusiveness of wet markets is another value of wet markets that we emphasized, based on the revealed negative relationship between income and consumption frequency of conventional vegetables. Since fresh foods at wet markets tend to be a product of the poor, this traditional retail outlet in large cities is crucial to enable their access to healthy and affordable diets. As such, wet markets' social and cultural values should be considered in urban planning policies.

Reducing consumers' perceived risk of foods sold at wet markets requires action against the lack of food safety and hygiene, which has been a significant challenge of these traditional markets. To do so, more inspections and testing of foods sold at this traditional retail are required. Due to limited resources, inspections and testing has not been conducted frequently at wet markets (Pham & Dinh, 2020). This situation must be addressed to enhance food safety and consumer confidence in foods at traditional markets. In addition, food safety education, which is currently unsufficient (Pham & Dinh, 2020), should reach all traders and food sellers at wet markets to change their attitude and behaviour toward adopting good food safety practices.

We acknowledge that this study is like a touch to a surface of deep and complex interlinks among trust, risk perception, and benefit perception with food choice under risks in the Southeast Asia context.

An unanticipated direction of the effect of trust found in this study requires further investigations. Moreover, the influence of utilitarian benefits, hedonic benefits, and their relationship on risky food choices remains a new topic for up coming studies. Through this paper, we open a window for future research.

Authors' contribution

Thanh Mai Ha collected data, analyzed the results, and wrote the manuscript. Helena Hansson, Assem Abu Hatab, Dietrich Darr, and Shamim Shakur aided in interpreting the results and writing the manuscript. All authors discussed the results and commented on the manuscript.

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Ethical statement

Our institution does not require ethical approval for this study.

Verbal informed consent was obtained from the respondents for their anonymized information to be published in this article.

Declaration of competing interest

This paper has no conflict of interest.

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References

Aschemann-Witzel, J., & Zielke, S. (2017). Can't buy me green? A review of consumer perceptions of and behavior toward the price of organic food. *Journal of Consumer Affairs, 51*(1), 211–251.

Barton, A., Richardson, C. D., & McSweeney, M. B. (2020). Consumer attitudes toward entomophagy before and after evaluating cricket (Acheta domesticus)-based protein powders. *Journal of food science, 85*(3), 781–788.

Blais, A.-R., & Weber, E. U. (2006). A domain-specific risk-taking (DOSPERT) scale for adult populations. *Judgment and decision making, 1*(1).

Choi, J., Lee, A., & Ok, C. (2013). The effects of consumers' perceived risk and benefit on attitude and behavioral intention: A study of street food. *Journal of Travel & Tourism Marketing, 30*(3), 222–237.

Evangelista, F., Low, B. K., & Nguyen, M. T. (2019). How shopping motives, store attributes and demographic factors influence store format choice in Vietnam: A logistic regression analysis. *Asia Pacific Journal of Marketing & Logistics*.

Fox, J. A. S., Lusk, J., Roosen, J., & Shogren, J. (2011). Risk preferences and food consumption. *The Oxford Handbook of the Economics of Food Consumption and Policy, 75*.

Galati, A., Moavero, P., & Crescimanno, M. (2019). Consumer awareness and acceptance of irradiated foods: the case of Italian consumers. *British Food Journal, 121*(6), 1398–1412.

Ghali, Z. Z. (2020). Effect of utilitarian and hedonic values on consumer willingness to buy and to pay for organic olive oil in Tunisia. *British Food Journal*.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Sage publications.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice, 19*(2), 139–152.

Hakim, M. P., Zanetta, L. D. A., de Oliveira, J. M., & da Cunha, D. T. (2020). The mandatory labeling of genetically modified foods in Brazil: Consumer's knowledge, trust, and risk perception. *Food Research International, 132*, Article 109053.

Hansen, A. (2021). Negotiating unsustainable food transformations: Development, middle classes and everyday food practices in Vietnam. *European Journal of Development Research*, 1–19.

Ha, T. M., Shakur, S., & Do, K. H. P. (2020). Risk perception and its impact on vegetable consumption: A case study from Hanoi, Vietnam. *Journal of Cleaner Production, 271*, Article 122793.

Ha, T. M., Shakur, S., & Pham Do, K. H. (2019). Consumer concern about food safety in Hanoi, Vietnam. *Food Control, 98*, 238–244.

Henson, S. (2003). The economics of food safety in developing countries. *ESA Working Paper, 19*(3), 19–30.

Howard, M. C. (2016). A review of exploratory factor analysis decisions and overview of current practices: What we are doing and how can we improve? *International Journal of Human-Computer Interaction, 32*(1), 51–62.

Hu, L.t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55.

Huong, P. T. T., Everaarts, A., Neeteson, J., & Struik, P. (2013). Vegetable production in the red river delta of Vietnam. I. Opportunities and constraints. *NJAS - Wageningen Journal of Life Sciences, 67*, 27–36.

Kim, J., et al. (2017). The effect of sensation seeking and emotional brand attachment on consumers' intention to consume risky foods in restaurants. *Journal of Foodservice Business Research, 20*(3), 336–349.

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4 ed.). Guilford (Chapter 10).

Lee, H.-J., & Yun, Z.-S. (2015). Consumers' perceptions of organic food attributes and cognitive and affective attitudes as determinants of their purchase intentions toward organic food. *Food Quality and Preference, 39*, 259–267.

Legendre, T. S., & Baker, M. A. (2020). Legitimizing edible insects for human consumption: The impacts of trust, risk–benefit, and purchase activism. *Journal of Hospitality & Tourism Research*, Article 1096348020914375.

Lin, C.-H., Sher, P. J., & Shih, H.-Y. (2005). Past progress and future directions in conceptualizing customer perceived value. *International Journal of Service Industry Management, 16*(4), 318–336.

Luchs, M. G., Naylor, R. W., Irwin, J. R., & Raghunathan, R. (2010). The sustainability liability: Potential negative effects of ethicality on product preference. *Journal of Marketing, 74*(5), 18–31.

Lusk, J. L., & Briggeman, B. C. (2009). Food values. *American Journal of Agricultural Economics, 91*(1), 184–196.

Maehle, N., Iversen, N., Hem, L., & Otnes, C. (2015). Exploring consumer preferences for hedonic and utilitarian food attributes. *British Food Journal, 117*(12), 3039–3063.

Nardi, V. A. M., Teixeira, R., Ladeira, W. J., & de Oliveira Santini, F. (2020). A meta-analytic review of food safety risk perception. *Food Control, 112*, Article 107089.

Ngo, M. H., Vu, H. Q., Liu, R., Moritaka, M., & Fukuda, S. (2019). *Challenges for the development of safe vegetables in vietnam: An insight into the supply chains in Hanoi city*.

Nguyen, T. D. A., Awasthi, S. P., Hoang, P. H., Nguyen, P. D., Jayedul, H., Hatanaka, N., Hinenoya, A., Van Dang, C., Faruque, S. M., & Yamasaki, S. (2021). Prevalence, serovar, and antimicrobial resistance of nontyphoidal Salmonella in vegetable, fruit, and water samples in Ho chi Minh city, Vietnam. *Foodborne Pathogens and Disease, 18*(5), 354–363.

Nguyen, T. K., Bui, H. T., Truong, T. A., Lam, D. N., Ikeuchi, S., Ly, L. K. T., Hara-Kudo, Y., Taniguchi, T., & Hayashidani, H. (2021). Retail fresh vegetables as a potential source of Salmonella infection in the Mekong Delta, Vietnam. *International Journal of Food Microbiology, 341*, Article 109049.

Nguyen, Q. T., Nguyen, T. D., Nguyen, N. T., Janda, T., Szalai, G., & Le, T. G. (2020). The potential health risks and environmental pollution associated with the application of plant growth regulators in vegetable production in several suburban areas of Hanoi, Vietnam. *Biologia Futura, 71*(3), 323–331.

Nystrand, B. T., & Olsen, S. O. (2020). Consumers' attitudes and intentions toward consuming functional foods in Norway. *Food Quality and Preference, 80*, Article 103827.

Olsen, S. O., & Tuu, H. H. (2017). Time perspectives and convenience food consumption among teenagers in Vietnam: The dual role of hedonic and healthy eating values. *Food Research International, 99*, 98–105.

Orkusz, A., Wolańska, W., Harasym, J., Piwowar, A., & Kapelko, M (2020). Consumers' attitudes facing entomophagy: Polish case perspectives. *International journal of environmental research and public health, 17(7)*(2427).

Otter, V., Prechtel, B., & Theuvsen, L. (2018). Country of origin effect for food products from developing and transition countries: A pls analysis of German consumers' perception. *Journal of International Food & Agribusiness Marketing, 30*(4), 355–381.

Pallas, F., Mittal, V., & Groening, C. (2014). Allocation of resources to customer satisfaction and delight based on utilitarian and hedonic benefits. *Journal of Research in Marketing, 2*(1), 106–112.

Pham, H. V., & Dinh, T. L. (2020). The Vietnam's food control system: Achievements and remaining issues. *Food Control, 108*, Article 106862.

Rodríguez-Entrena, M., Salazar-Ordóñez, M., & Sayadi, S. (2013). Applying partial least squares to model genetically modified food purchase intentions in southern Spain consumers. *Food Policy, 40*, 44–53.

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research, 99*(6), 323–338.

Schreinemachers, P., Grovermann, C., Praneetvatakul, S., Heng, P., Nguyen, T. T. L., Buntong, B., Le, N. T., & Pinn, T. (2020). How much is too much? Quantifying pesticide overuse in vegetable production in Southeast Asia. *Journal of Cleaner Production, 244*, Article 118738.

Schröck, R. (2012). The organic milk market in Germany is maturing: A demand system analysis of organic and conventional fresh milk segmented by consumer groups. *Agribusiness, 28*(3), 274–292.

Seo, K. H., & Lee, J. H. (2021). Understanding risk perception toward food safety in street food: The relationships among service quality, values, and repurchase intention. *International Journal of Environmental Research and Public Health, 18*(13), 6826.

Shih-Tse Wang, E. (2015). Different effects of utilitarian and hedonic benefits of retail food packaging on perceived product quality and purchase intention. *Journal of Food Products Marketing*, 1–13.
Siegrist, M., Stampfli, N., Kastenholz, H., & Keller, C. (2008). Perceived risks and perceived benefits of different nanotechnology foods and nanotechnology food packaging. *Appetite, 51*(2), 283–290.
Slovic, P., & Peters, E. (2006). Risk perception and affect. *Current Directions in Psychological Science, 15*(6), 322–325.
Starr, C. (1985). Risk management, assessment, and acceptability. *Risk Analysis, 5*(2), 97–102.
Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of Retailing, 77*(2), 203–220.
Tran, V. H., & Sirieix, L. (2020). Shopping and cross-shopping practices in Hanoi Vietnam: An emerging urban market context. *Journal of Retailing and Consumer Services, 56*, Article 102178.
Van Doorn, J., & Verhoef, P. C. (2011). Willingness to pay for organic products: Differences between virtue and vice foods. *nternational Journal of Research in Marketing,, 28*(3), 167–180.
Van Hoi, P., Mol, A. P., Oosterveer, P., van den Brink, P. J., & Huong, P. T. (2016). Pesticide use in Vietnamese vegetable production: A 10-year study. *International Journal of Agricultural Sustainability, 14*(3), 325–338.
Vu, P. A., Phan, T. T. H., & Cao, T. K. (2015). An exploratory investigation into customer perceived value of food products in Vietnam. *International Business Research, 8*(12), 1.
Wansink, B., Sonka, S. T., & Cheney, M. M. (2022). A cultural hedonic framework for increasing the consumption of unfamiliar foods: soy acceptance in Russia and Colombia. *Applied Economic Perspectives and Policy, 24*(2), 353–365.
Weber, E. U., Blais, A. R., & Betz, N. E. (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making, 15*(4), 263–290.
Wertheim-Heck, S., Raneri, J. E., & Oosterveer, P. (2019). Food safety and nutrition for low-income urbanites: Exploring a social justice dilemma in consumption policy. *Environment and Urbanization, 31*(2), 397–420.
Wertheim-Heck, S. C., & Spaargaren, G. (2015). Shifting configurations of shopping practices and food safety dynamics in Hanoi, Vietnam: A historical analysis. *Agriculture and Human Values*, 1–17.
Wertheim-Heck, S. C., Spaargaren, G., & Vellema, S. (2014). Food safety in everyday life: Shopping for vegetables in a rural city in Vietnam. *Journal of Rural Studies, 35*, 37–48.
Williams, R. (2016). Understanding and interpreting generalized ordered logit models. *Journal of Mathematical Sociology, 40*(1), 7–20.
World Bank. (2017). *Food safety risk management in vietnam: Challenges and opportunities: Technical working number. Hanoi, vietnam: World bank report*. W. Bank. https://www.worldbank.org/en/country/vietnam/publication/food-safety-risk-management-in-vietnam-challenges-and-opportunities.
Wu, X., Yang, D. L., & Chen, L. (2017). The politics of quality-of-life issues: Food safety and political trust in China. *Journal of Contemporary China, 26*(106), 601–615.
Wu, W., Zhang, A., van Klinken, R. D., Schrobback, P., & Muller, J. M. (2021). Consumer trust in food and the food system: A critical review. *Foods, 10*(10), 2490.
Xie, X., Huang, L., Li, J. J., & Zhu, H. (2020). Generational differences in perceptions of food health/risk and attitudes toward organic food and game meat: The case of the COVID-19 crisis in China. *International journal of environmental research and public health, 17*(3148).
Zhang, Y., Jing, L., Bai, Q., Shao, W., Feng, Y., Yin, S., & Zhang, M. (2018). Application of an integrated framework to examine Chinese consumers' purchase intention toward genetically modified food. *Food Quality and Preference, 65*, 118–128.