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Consumer attitudes and intentions toward safe pork in a frontier market: A theory of planned behaviour analysis

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Abstract:

Growing food safety awareness in Vietnam's urbanising regions has heightened interest in safe pork consumption, yet the behavioural drivers remain underexamined. This study employs the theory of planned behaviour (TPB) to explore the factors shaping safe pork adoption among consumers in Gia Lam commune, a frontier market. Survey findings indicate that attitude most strongly influences purchase intention, followed by subjective norms and perceived behavioural control, with intention serving as a key predictor of purchase behaviour. These results underscore the primacy of health-driven motivations moderated by access limitations and provide a fresh application of the theory in an emerging context. The research offers insights for public health initiatives and food labelling strategies, identifying critical leverage points for producers and policymakers to promote safe pork uptake while highlighting the need for broader investigations across Vietnam's diverse markets.

Keywords: **consumer behaviour, food safety, frontier market, safe pork consumption, theory of planned behaviour.**

Classification numbers: **2.2, 4.1, 7**

1. Introduction

Pork constitutes a fundamental element of daily dietary practices in Vietnamese households, prized for its nutritional value, affordability, and widespread acceptance. In contrast to poultry, beef or seafood, pork is broadly regarded as a versatile and enduring protein source, rendering it a staple across diverse socio-economic strata. According to data from the General Statistics Office (2024) [1], pork represents approximately 65-70% of total meat consumption within the typical Vietnamese family, with poultry accounting for 15-20%, and beef and seafood comprising the residual share. This predominance underscores pork's profound cultural and economic significance within Vietnam's culinary and nutritional framework, a pattern echoed in local preferences for other culturally resonant foods like coffee [2]. Additionally, consumer engagement through digital platforms, which W. Martens (2024) [3] has shown to be effective in enhancing product visibility and consumer outreach, could similarly improve transparency and consumer confidence in safe pork markets.

In recent years, escalating public apprehension regarding food safety and traceability has catalysed growing interest in "safe pork" - meat characterised by hygienic processing, appropriate packaging, and transparent sourcing. Despite this heightened consciousness, the market penetration of safe pork in urban hubs such as Hanoi has fallen short of consumer expectations. Traditional markets and small-scale vendors frequently offer meat of indeterminate provenance, devoid of formal certification or quality guarantees. This challenge is exacerbated by fluctuating pork prices, driven primarily by escalating import costs, which have disrupted consumer purchasing patterns and diminished demand for certified safe products.

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Gia Lam commune, situated on the periphery of Hanoi, provides a pertinent case study for exploring these shifting consumption dynamics. As one of the capital's most densely populated and rapidly urbanising locales, with a population of 321,797, Gia Lam exemplifies evolving consumer preferences shaped by local cultural dimensions [2]. Recent empirical research indicates that residents are prepared to pay a premium of 20-30% for pork certified as safe and traceable, relative to conventionally sourced alternatives [4]. Such behaviour reflects wider societal currents emphasising food safety, public health, and environmental sustainability.

Within this context, the present study investigates the determinants of safe pork consumption in Gia Lam commune. Utilising data derived from a structured survey conducted across five representative communes - Trau Quy, Dang Xa, Da Ton, Kieu Ky, and Bat Trang - this research probes the interplay of cognitive and social factors shaping consumer behaviour. Specifically, it applies the TPB to elucidate how attitude, subjective norm, and perceived behavioural control influence the intention to purchase safe pork and, subsequently, actual purchasing decisions. By delineating the relative salience of these factors, this study seeks to furnish actionable insights for policymakers, producers, and retailers aiming to align supply chains with the burgeoning demand for food safety and transparency in Vietnam's emergent markets - an alignment potentially strengthened by leadership approaches emphasising collaboration and stakeholder cooperation [5].

2. Theoretical framework and hypothesis development

2.1. Consumer behaviour: Conceptual foundations and definitions

Consumer behaviour constitutes a multidisciplinary field of inquiry, encapsulating the dynamic processes through which individuals and collectives navigate the acquisition, utilisation, and disposal of goods, services, and experiences. Seminal definitions by L.G. Schiffman (2013) [6] characterise consumer behaviour as the observable actions undertaken by individuals during the search, purchase, use, and evaluation of products and services aimed at fulfilling personal needs. Similarly, M.R. Solomon (1996) [7] frames it as an analytical lens examining how individuals or groups select, employ, or divest themselves of goods, services, or experiences to satisfy their desires. Expanding this discourse, D. Plessis (1994) [8] conceptualise consumer behaviour as a structured pattern of decision-making, spanning pre-purchase motivations, purchase actions, and post-purchase assessments, enacted by both individuals and familial units. P. Kotler, et al. (2020) [9] further refines this by emphasising discrete decision-making acts associated with product usage and disposal, underscoring the procedural complexity of consumption.

Collectively, these perspectives illuminate the multifaceted nature of consumer behaviour, typically delineated into sequential stages: need recognition, information search, evaluation of alternatives, purchase decision, and post-purchase reflection. Each stage is modulated by an interplay of internal factors (e.g., perceptions, attitudes, and motivations) and external influences (e.g., social norms and market stimuli). Within the domain of food safety, particularly meat consumption, the construct of "safe pork" assumes critical salience. Safe pork is defined as meat derived from healthy animals, reared and processed under stringent regulatory oversight, adhering to established hygiene and safety standards. N.V. Chung, et al. (2017) [10] specify that safe pork originates from pigs subjected to quarantine, veterinary testing, and processing in sanitised environments. Complementing this, L.T. Ha, et al. (2021) [4] describe it as the product of a standardised supply chain encompassing rearing, slaughter, processing, and distribution. For the purposes of this study, safe pork consumption behaviour is operationalised as the systematic process whereby consumers seek, assess, and procure pork products meeting formal safety criteria, driven by nutritional and health-related imperatives. This process mirrors patterns observed in other consumption domains where local product quality and safety contribute to sustainable economic growth and consumer trust.

2.2. Theoretical models of consumer behaviour

Theory of reasoned action (TRA): The TRA, articulated by I. Ajzen, et al. (1977) [11], posits that behavioural enactment is predominantly a function

of intention, which is itself shaped by two core constructs: attitude and subjective norms. Attitude denotes an individual's evaluative stance-positive or negative-toward performing a specific behaviour, while subjective norms reflect perceived social pressures emanating from significant others. TRA presupposes that beliefs about behavioural outcomes underpin attitudes, thereby linking cognition to action. Widely applied in consumer research, TRA elucidates how rational decision-making processes inform purchasing intentions, particularly in contexts where behaviours are volitionally controlled. Its utility lies in its parsimonious explanation of deliberate action, though it is limited by its exclusion of non-volitional influences.

Theory of planned behaviour (TPB): Extending TRA, I. Ajzen, et al. (1977) [11] introduced the TPB by integrating perceived behavioural control as a third determinant of intention. TPB asserts that behavioural intention arises from the confluence of attitude, subjective norms, and perceived behavioural control-the latter encapsulating an individual's self-assessed capacity to execute the behaviour amidst external constraints. This model excels in predicting behaviours subject to partial volitional control, distinguishing it from TRA. The three antecedents are delineated as follows: (1) *Attitude*, reflecting an individual's appraisal of the behaviour; (2) *Subjective norms*, capturing social expectations; and (3) *Perceived behavioural control*, gauging perceived feasibility. TPB's applicability to food choice, health-oriented behaviours, and ethical consumption underscores its relevance to this study, offering a robust framework for analysing safe pork purchasing decisions.

Black box model: The Black box model, originally proposed by P. Kotler, et al. (2020) [9] and refined in subsequent work, provides a stimulus-response paradigm for dissecting consumer behaviour. External stimuli - encompassing marketing initiatives and environmental factors - act as inputs that elicit consumer responses (e.g., purchase decisions) via internal psychological processes. These processes, termed the "black box", remain opaque, comprising consumer attributes (e.g., beliefs, values, motivations), and decision-making stages (e.g., problem recognition, information search, alternative evaluation, purchase, and post-purchase assessment). The model foregrounds the interplay between exogenous triggers and endogenous cognition, though it concedes the challenge of directly probing internal mechanisms. Its heuristic value lies in mapping observable outcomes to latent drivers, offering a complementary lens to TPB. Such mapping is particularly relevant when examining how local products influence consumption behaviour and regional economic implications [2].

Model of goal-directed behaviour (MGB): M. Perugini, et al. (2001) [12] advanced the model of MGB as an augmentation of TPB, addressing its neglect of emotional and motivational dimensions. MGB critiques TPB's rationalist bias, introducing constructs such as goal desire, anticipated emotions, and past behaviour as antecedents of intention. Goal desire serves as a motivational linchpin, mediating the effects of attitude, subjective norms, and perceived behavioural control, while anticipated emotions and prior experiences enrich the predictive framework. M. Perugini, et al. (2000) [13] argue that MGB captures the volitional pursuit of desired outcomes, integrating affective and habitual influences. This model is particularly germane to contexts where emotional resonance and routine shape preferences, such as the selection of safe or ethically sourced food products, enhancing its pertinence to the present investigation.

2.3. Hypothesis development

Drawing upon the conceptual underpinnings of the TPB, this study advances four hypotheses to elucidate the interrelationships among attitude, subjective norms, perceived behavioural control, purchase intention, and actual purchase behaviour within the context of safe pork consumption in Gia Lam commune. These hypotheses are formulated to test the predictive utility of TPB in explaining consumer decision-making processes, with each construct systematically linked to empirical expectations grounded in prior theoretical and contextual insights.

H1. Attitude toward safe pork exerts a significant positive influence on purchase intention.

Within the TPB framework, attitude encapsulates an individual's evaluative disposition-whether favourable or unfavourable-toward a specific behaviour. In the context of safe pork, a positive attitude emerges when consumers perceive the product as advantageous, hygienic, and consonant with health-related objectives for themselves or their households. Such evaluations are underpinned by cognitive beliefs (e.g., the nutritional superiority and safety assurances of safe pork) and affective responses (e.g., confidence in its traceability). Consistent with TPB's assertions, this study posits that a favourable attitude toward safe pork enhances consumers' intention to purchase, as positive appraisals amplify motivational drivers of behaviour.

H2. Subjective norms exert a significant positive influence on purchase intention.

Subjective norms, as delineated by TPB, reflect the perceived social pressures emanating from referent individuals or groups that shape behavioural intentions. In the realm of safe pork consumption, these pressures may originate from familial expectations, peer endorsements, or prevailing community norms advocating for safer food choices. In collectivist societies such as Vietnam, where social interdependence is pronounced, the influence of significant others is likely to be particularly salient. This hypothesis contends that when consumers perceive strong normative support for purchasing safe pork, their intention to conform to these expectations strengthens, thereby fostering a greater propensity to act.

H3. Perceived behavioural control exerts a significant positive influence on purchase intention.

Perceived behavioural control, a cornerstone of TPB, denotes an individual's self-assessed capacity to enact a behaviour, contingent upon both internal resources (e.g., knowledge, time) and external facilitators or impediments (e.g., availability, cost). In the case of safe pork, this construct captures consumers' confidence in overcoming barriers to procurement, such as identifying certified products or navigating price premiums. This hypothesis posits that heightened perceptions of control-stemming from accessible supply chains, affordability, or informational clarity-bolster purchase intention by reinforcing consumers' belief in their agency to execute informed and deliberate choices.

H4. Purchase intention exerts a significant positive influence on the actual purchase behaviour of safe pork.

Central to TPB is the premise that behavioural intention serves as the proximal determinant of action, mediating the effects of attitude, subjective norms, and perceived behavioural control. This hypothesis asserts that strong intentions to purchase safe pork - forged through favourable evaluations, social reinforcement, and perceived feasibility - translate into tangible purchasing behaviour, provided external constraints (e.g., market availability) do not substantially impede execution. The predictive strength of intention is expected to be robust in contexts where volitional control is high and intentions are well-defined, thereby supporting the proposed linkage between intention and the actual acquisition of safe pork.

3. Methodology

3.1. Sampling strategy

The determination of an appropriate sample size for this study adheres to the guidelines proposed by F. Hair, et al. (2014) [14], who advocate a minimum of five observations per questionnaire item to ensure adequate statistical power and representativeness in quantitative research. Given that the research instrument encompasses 20 variables, this criterion establishes a baseline sample size of 100 respondents. However, to bolster the analytical robustness, mitigate potential response variability, and enhance the generalisability of findings within the context of Gia Lam commune, a total of 200 valid responses were collected. This expanded sample exceeds the minimum threshold, thereby strengthening the reliability of statistical inferences despite constraints in time and resources.

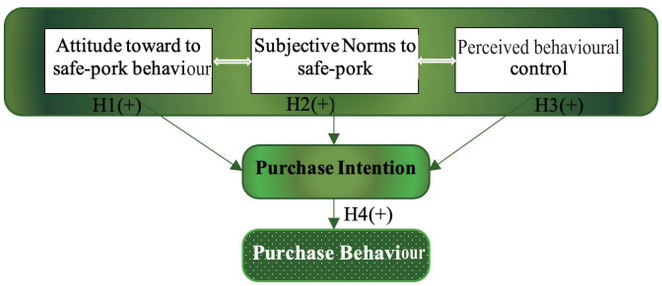

Fig. 1. Research model. Source: Compiled by the authors.

Respondents were drawn from the resident population of Gia Lam commune, ensuring contextual relevance to the study's focus on safe pork consumption.

3.2. Data collection

Primary data were gathered through a meticulously designed survey administered across five communes in Gia Lam commune: Trau Quy, Dang Xa, Da Ton, Kieu Ky, and Bat Trang. To ensure a representative cross-section of the local populace and minimise selection bias, participants were recruited using convenience and snowball sampling via online distribution technique, a method widely recognised for its capacity to yield unbiased and generalisable samples.

The survey instrument was structured to capture three distinct yet interrelated dimensions of consumer behaviour. The initial section probed respondents' experiences and practices related to safe pork consumption, providing a behavioural baseline. The second section evaluated the influence of psychological and contextual determinants-namely attitude, subjective norms, and perceived behavioural control-on purchase intention, aligning with the theoretical framework of the TPB. The final section elicited demographic data, including gender, age, occupation, and income level, to facilitate subgroup analysis and contextual interpretation.

The questionnaire integrated a combination of multiple-choice items and five-point Likert-scale questions, enabling the collection of both categorical and ordinal data suitable for robust statistical analysis. To optimise accessibility and response rates, the instrument was digitised using Google Forms and distributed online via a secure link targeted to residents within the specified communes. Recent research by M. Pang, et al. (2022) [15] has demonstrated the importance of adapting data collection methodologies to contemporary challenges, particularly in Vietnamese contexts where digital approaches can simultaneously maintain research integrity while accommodating evolving social circumstances. Prior to full implementation, the questionnaire underwent rigorous content validation by a panel of academic peers, ensuring clarity, relevance, and fidelity to the research objectives. This pre-testing phase refined the instrument, enhancing its precision and alignment with the study's conceptual aims, thereby reinforcing the methodological integrity of the data collection process.

3.3. Data analysis

Descriptive statistics: Descriptive statistical methods were employed to characterise the respondent profile and elucidate key patterns in safe pork consumption behaviour. Frequency distributions, means, and standard deviations were calculated to summarise demographic attributes and behavioural tendencies, providing a foundational overview of the sample and its responses. This preliminary analysis facilitated the identification of trends and variability, setting the stage for subsequent inferential testing.

Reliability assessment using Cronbach's alpha: To ascertain the internal consistency of the measurement scales, Cronbach's alpha reliability analysis was conducted, a widely accepted metric for evaluating the coherence of multi-item constructs. This coefficient measures the extent to which items within a scale are intercorrelated, serving as a robust indicator of reliability. Items exhibiting a corrected item-total correlation below 0.3 were flagged for potential exclusion, as such values suggest limited contribution to the construct's integrity.

Following J.C. Nunnally, et al. (1994) [16], a Cronbach's alpha threshold of 0.6 was adopted as the minimum standard for acceptable reliability, with values between 0.7 and 0.8 deemed good, and those ranging from 0.8 to 1.0 classified as very good [17]. However, Alpha coefficients exceeding 0.95 were scrutinised to guard against item redundancy or excessive conceptual overlap, ensuring the scales remained parsimonious and theoretically distinct.

This multi-tiered analytical approach-encompassing descriptive profiling and rigorous reliability testing-established a solid foundation for subsequent statistical modelling. By retaining only those constructs demonstrating psychometric soundness, the methodology enhances the credibility and validity of the empirical findings, aligning with the study's objective of delivering actionable insights into safe pork consumption behaviour.

Exploratory factor analysis (EFA): EFA was employed as a statistical technique to evaluate the construct validity of the measurement scales and to delineate the latent factor structure underlying the observed variables. EFA functions as a data reduction method, consolidating a multiplicity of correlated variables into a smaller set of interpretable latent constructs, termed factors while maximising the retention of original variance. This approach is particularly valuable in refining measurement instruments and ensuring that emergent factors align with the theoretical framework of the study.

In the present investigation, EFA was applied to a set of 20 observed variables derived from the survey instrument. The analysis commenced with an assessment of data suitability using Bartlett's Test of Sphericity, which tests the null hypothesis that the correlation matrix is an identity matrix, thereby confirming the presence of sufficient inter-variable correlations for factor analysis. Concurrently, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was calculated, with a minimum threshold of 0.5 established as the criterion for proceeding with factor extraction, in accordance with conventional standards [18]. A KMO value exceeding this benchmark indicates that the dataset is appropriate for factorisation.

Factor extraction was conducted using principal component analysis (PCA) with varimax rotation, a method selected to maximise the orthogonality of factors and enhance interpretability. Variables exhibiting factor loadings below the widely accepted threshold of 0.50 were excluded to ensure a robust and parsimonious factor structure, as loadings below this level suggest insufficient contribution to the latent construct [14]. Factor retention was guided by the H.F. Kaiser (1974) [18] criterion, whereby only factors with Eigenvalues greater than 1.0 were retained, reflecting their substantive explanatory power. Additionally, the cumulative percentage of variance explained by the retained factors was examined to ascertain the extent to which the factor solution accounted for the original variability in the data, with a target of at least 50% deemed satisfactory for behavioural research. This rigorous application of EFA ensures that the derived constructs are both statistically sound and theoretically meaningful, laying a solid foundation for subsequent analyses.

Correlation analysis: Following the validation of measurement scales through EFA, Pearson correlation analysis was undertaken to examine the strength and direction of linear relationships between independent and dependent variables, thereby establishing the empirical ground - work for regression modelling. This analytical step is critical for verifying the assumption of linearity - a prerequisite for inferential techniques - and for identifying patterns of association consistent with the hypotheses derived from the TPB.

The Pearson correlation coefficient (r), ranging from -1 to +1, quantifies the magnitude and direction of linear relationships, with values approaching +1 or -1 indicating strong positive or negative associations, respectively, and a value of 0 denoting the absence of a linear relationship. In this study, correlation coefficients were computed for all pairs of variables, with statistical significance assessed at the 0.05 level to ensure robustness. Only those variables demonstrating significant and theoretically coherent correlations were retained for inclusion in subsequent regression models, thereby enhancing the precision of the analysis. Additionally, the correlation matrix was scrutinised for evidence of multicollinearity among predictors, with high intercorrelations (e.g., r>0.80) flagged as potential threats to model stability. This diagnostic step aligns with established methodological protocols in behavioural research [19], ensuring that the variables selected for further analysis are both empirically justified and free from confounding redundancies. This systematic approach to correlation

analysis not only reinforces the study's methodological rigor but also provides a critical bridge between exploratory and confirmatory phases of data analysis, facilitating a coherent transition to hypothesis testing and model estimation.

Regression analysis: Following the establishment of linear relationships among variables through correlation analysis, linear regression was employed to model causal effects, adhering to the methodological framework outlined by H. Trong, et al. (2008) [17]. This statistical technique quantifies the strength and direction of influence exerted by independent variables on dependent variables, enabling the testing of hypothesised relationships within the TPB.

Multivariate regression analysis was conducted in two stages. In the first stage, the combined effects of attitude (AT), subjective norms (SN), and perceived behavioural control (BC) on purchase intention (PI) were estimated. This model assesses how these psychological factors collectively shape consumers' intent to purchase safe pork. In the second stage, a separate regression examined the effect of purchase intention (PI) on actual purchase behaviour (PB), testing the extent to which intention translates into action. The regression models are expressed as follows:

Model 1: Predicting purchase intention

$$PI = \alpha + \beta_1 AT + \beta_2 SN + \beta_3 BC + \varepsilon$$

Model 2: Predicting purchase behaviour

$$PB = \alpha + \beta PI + \varepsilon$$

Here, α represents the intercept, β coefficients denote the magnitude of influence of each independent variable, and ε is the error term capturing unexplained variance. These equations provide a structured approach to evaluating the directional impact of predictor variables on outcomes, facilitating hypothesis testing with precision.

Measurement items and scale design: This study employed a structured questionnaire comprising 20 observed indicators, operationalising five latent constructs central to the TPB: attitude, subjective norms, perceived behavioural control, purchase intention, and purchase behaviour. Each indicator was assessed using a five-point Likert scale, ranging from 1 ("Completely disagree") to 5 ("Completely agree"), a format selected for its capacity to capture gradations in respondent perceptions while facilitating robust statistical analysis. The indicators were carefully adapted from established literature to ensure theoretical alignment and contextual relevance to safe pork consumption in Gia Lam commune. Table 1 delineates the indicator codes, measurement items, and their respective scholarly sources, providing a transparent basis for the operationalisation of the construct.

4. Results

4.1. Research site characteristics

Gia Lam is an eastern commune of Hanoi, covering 116.64 km² with a population of 321,797, comprising 20 communes and 2 townships [1]. The commune shares the typical tropical monsoon climate of the Red river delta, characterised by a hot, humid season from April to October and a dry, cooler season from November to March. The annual average temperature is 23.5°C, with rainfall ranging from 1,400 to 1,600 mm - mainly concentrated in the summer months alongside high solar radiation and seasonal monsoons that influence local agricultural activities.

Gia Lam invested approximately 1,404 billion VND in 335 construction projects, including 41 key transport and urban infrastructure developments [1]. The commune prioritises improving connectivity and public amenities, targeting the completion of seven major roads by 2025 and continuing broader infrastructure development through 2030. Significant efforts are also directed toward the construction of educational facilities and rural upgrading under the National Target Program on New Rural Development.

To accelerate the transition toward an advanced and model rural commune, Gia Lam has mobilised its entire political system. As a result, all communes have achieved advanced rural standards, with five designated as model communes - exceeding the targets set by the 22nd District Party Congress. The

Table 1. Research indicators.

Latent variable	Label/code	Indicator name	Sources
4*Attitude	AT1	Purchasing safe pork is very important	[20]
	AT2	Purchasing safe pork is the right thing	
	AT3	Purchasing safe pork is a wise choice	
	AT4	You feel satisfied of purchasing safe pork	
5*Subjective norms	SN1	You will buy safe pork when you get more information from advertisements	[21]
	SN2	The people that consult with you support you in buying safe pork	
	SN3	Your relatives encourage you to buy safe pork	
	SN4	Your friends and colleagues recommend buying safe pork	
	SN5	People who are important to you support purchasing safe pork	
4*Perceived behavioural control	PC1	You think buying safe pork is easy for you	[11]
	PC2	Giving up the habit of buying unknown-origin pork is not difficult; you just need to be determined	
	PC3	It is easy to find and buy safe pork in your area	
	PC4	Finding information to buy safe pork is simple for you	
4*Purchase intention	PI1	You will buy safe pork because it has a clear origin and information	[11]
	PI2	You will buy safe pork because it is suitable for your income	
	PI3	You will buy safe pork because it is good for you and your family	
	PI4	You will buy safe pork in the future	
3*Purchase behaviour	PB1	You often buy safe pork	[11]
	PB2	In the past one month, you have regularly bought safe pork	
	PB3	You usually buy safe pork under normal conditions	

Source: Compiled by the authors.

commune has also recorded notable accomplishments in education, with 92.4% of public schools meeting national standards, alongside effective administrative reforms, stable public security, and strengthened local defence.

From a socio-economic perspective, Trau Quy township and Dang Xa, Da Ton, Kieu Ky, and Bat Trang communes stand out for their high population density, elevated income levels, and strong consumer demand. These areas reflect a diverse socio-economic landscape, blending agriculture, industry, and traditional crafts, making them representative of the commune's broader development dynamics

4.2. Demographic profile

The survey sample from Gia Lam commune reveals a diverse yet distinctive demographic profile, predominantly comprising young, educated females. Females constitute 57% (*n*=114) of respondents compared to 43% males (*n*=86), with 59% (*n*=118) aged 20-30, followed by 36.5% (*n*=73) over 30, and 4.5% (*n*=9) under 20, reflecting an urbanising, youthful cohort. Educationally, 60% (*n*=120) hold undergraduate degrees, with 13% (*n*=26) high school graduates, 6.5% (*n*=13) postgraduates, and 20.5% (*n*=41) in other categories, suggesting a capacity for informed food safety decisions.

Table 2. Demographic characteristics of respondents.

Criteria		Frequency	Percentage (%)
Gender	Male	86	43.0
	Female	114	57.0
Age	Under 20 years old	9	4.5
	20-30 years old	118	59.0
	Over 30 years old	73	36.5
Education	High-school	26	13.0
	Undergraduates	120	60.0
	Postgraduates	13	6.5
	Other	41	20.5
Occupation	Business owner	37	18.5
	Public servant	16	8.0
	Office worker	34	17.0
	Student	62	31.0
	Housewife	18	9.0
	Other	33	16.5
Income	Below 5 million VND	55	27.5
	5-10 million VND	50	25.0
	10-15 million VND	51	25.5
	More than 15 million VND	44	22.0
Family member	1-2 people	47	23.5
	3-4 people	108	54.0
	5-6 people	41	20.5
	More than 6 people	4	2.0

Source: From the survey 2024.

Occupationally, students (31%, *n*=62) lead, followed by business owners (18.5%, *n*=37), office workers (17%, *n*=34), and others, while income skews moderate, with most below 15 million VND monthly (e.g., 27.5%, *n*=55, below 5 million VND). Household sizes are typically small to medium, with 54% (*n*=108) in 3-4 member families, with smaller proportions living in households of 1-2 members (23.5%), 5-6 members (20.5%), and very few (2%) residing in households exceeding 6 individuals. This composition detailed in Table 2 offers a robust basis for analysing safe pork consumption within the TPB framework, highlighting socio-economic diversity and contextual relevance.

4.3. Perceptions of safe pork

Concern for pork safety is high, with 43% (*n*=86) rating it significant and less than 10% unconcerned. Attributes defining "safe pork" include clear origin (53.5%, *n*=107), clear packaging (46.5%, *n*=93), and supermarket sales (45.5%, *n*=91) (Table 3).

Table 3. Consumer awareness of safe pork attributes.

	N	Percent (%)	Percent of cases
Has clear origin	107	23.2	53.5
Has quarantine mark	81	17.6	40.5
Has clear packaging	93	20.2	46.5
Sell in supermarket	91	19.7	45.5
Sell in safe pork store	63	13.7	31.5
Other	26	5.6	13.0

Source: From the survey 2024.

4.4. Consumption patterns

The weekly pork consumption data reveals a predominant consumption range of 1-3 kg (57.5%, *n*=115), with a notable segment consuming less than

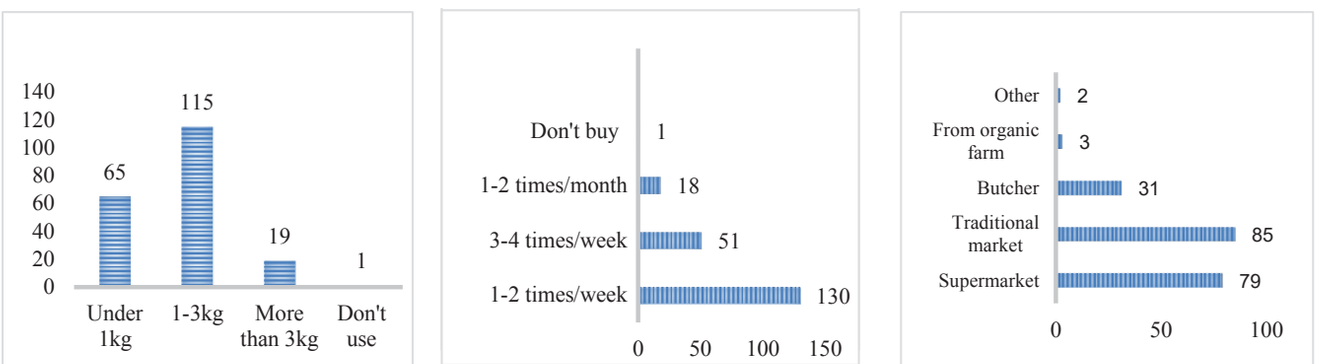

Fig. 2. Volume, frequency, and place of safe pork consumption. Source: The survey 2024 (Unit: respondents).

1 kg (32.5%, *n*=65), while frequency analysis indicates that nearly two-thirds of respondents (65%, *n*=130) consume pork 1-2 times weekly. Consumer purchase motivations primarily emphasise convenience (35%, *n*=71) and price considerations (28%, *n*=56), with purchase information being derived equally from internet sources and previous buying experiences (56%, *n*=112 for each category) (Fig. 2, Tables 4 and 5).

Table 4. Reasons for frequent purchasing of safe pork.

	Frequency	Percent	Valid percent	Cumulative percent
Cheap price	56	28.0	28.0	28.0
Convenient to buy	71	35.5	35.5	63.5
Verified origin	48	24.0	24.0	87.5
Familiar with the seller	23	11.5	11.5	99.0
Other	2	1.0	1.0	100.0
Total	200	100.0	100.0	

Source: Results from SPSS.

Table 5. Consumer information channels.

	N	Percent (%)	Percent of cases
Internet	112	27.9	56.0
TV, Radio	53	13.2	26.5
Friend, relative	56	14.0	28.0
Buying experience	112	27.9	56.0
Package of safe pork	45	11.2	22.5
Other	23	5.7	11.5
Total	401	100.0	200.5

Source: Results from SPSS.

4.5. Statistical findings

Cronbach's alpha confirmed scale reliability: attitude (α=0.765), subjective norms (α=0.767), perceived behavioural Control (α=0.706), and purchase intention (α=0.701) all exceeded the 0.6 threshold. Purchase Behaviour improved from α=0.568 to α=0.638 after removing PB3 (correlation=0.255) (Table 6).

Table 6. Reliability of scales.

Latent variable	Items (indicator)	Corrected item - Total correlation	Cronbach's alpha if item deleted
Attitude	AT1	0.574	0.704
	AT2	0.566	0.709
	AT3	0.601	0.690
	AT4	0.518	0.734
Cronbach's alpha coefficient of the factor: 0.765			
Subjective norms	SN1	0.610	0.703
	SN2	0.466	0.748
	SN3	0.496	0.739
	SN4	0.511	0.736
	SN5	0.625	0.695
Cronbach's alpha coefficient of the factor: 0.767			
Perceived behavioural control	PC1	0.445	0.673
	PC2	0.454	0.667
	PC3	0.588	0.583
	PC4	0.495	0.644
Cronbach's alpha coefficient of the factor: 0.706			
Purchase intention	PI1	0.623	0.546
	PI2	0.433	0.669
	PI3	0.518	0.625
	PI4	0.411	0.703
Cronbach's alpha coefficient of the factor: 0.701			
Purchase behaviour (1st)	PB1	0.425	0.390
	PB2	0.464	0.325
	PB3	**0.255**	0.638
Cronbach's alpha coefficient of the factor: **0.568**			
Purchase behaviour (2nd)	PB1	0.468	.
	PB2	0.468	.
Cronbach's alpha coefficient of the factor: **0.638**			

Source: Results from SPSS.

EFA yielded KMO coefficients are greater than 0.5, Bartlett's *p*=0.000, and 56.482% variance extracted, with all factor loadings greater than 0.5 (Table 7).

Table 7. Rotated component matrix.

	Component		
	1	*2*	*3*
SN5	0.799		
SN1	0.780		
SN3	0.624		
SN4	0.597		
SN2	0.544		
AT1		0.825	
AT2		0.708	
AT3		0.694	
AT4		0.682	
PC3			0.819
PC2			0.681
PC1			0.661
PC4			0.599

Extraction method: Principal component analysis. Rotation method: Varimax with kaiser normalisation. Source: Results from SPSS.

Pearson correlations showed Purchase Behaviour linked to Purchase Intention (r=0.496, p<0.01), Subjective Norms (r=0.301, p<0.01), Attitude (r=0.344, p<0.01), and Perceived Behavioural Control (r=0.282, p<0.01) (Tables 8-10).

Table 8. Correlation results.

		PB	PI	SN	AT	PC
PB	Pearson correlation	1	0.496**	0.301**	0.344**	0.282**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
	N	200	200	200	200	200
PI	Pearson correlation	0.496**	1	0.526**	0.581**	0.430**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000
	N	200	200	200	200	200
SN	Pearson correlation	0.301**	0.526**	1	0.479**	0.493**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000
	N	200	200	200	200	200
AT	Pearson correlation	0.344**	0.581**	0.479**	1	0.262**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
	N	200	200	200	200	200
PC	Pearson correlation	0.282**	0.430**	0.493**	0.262**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	N	200	200	200	200	200

**Correlation is significant at the 0.01 level (2-tailed). Source: Results from SPSS.

Regression analysis produced two models:

Model 1: Purchase intention (Adjusted R^2=0.442, F=53.568, p<0.001)

$$PI = 1.147 + 0.222SN + 0.419AT + 0.210PC + \varepsilon \text{ (VIF < 2)}$$

Table 9. R-square for first model.

Model Summary[b]					
Model	*R*	*R square*	*Adjusted R square*	*Std. error of the estimate*	*Durbin-watson*
1	0.671[a]	0.451	0.442	0.42696	1.863

a. Predictors: (Constant), PC, AT, SN; b. Dependent Variable: PI.Source: Results from SPSS.

Table 10. Regression coefficients for first model.

Coefficients[a]								
Model		*Unstandardised coefficients*		*Standardised coefficients*	*t*	*Sig.*	*Collinearity statistics*	
	B	*Std. Error*	*Beta*			*Tolerance*	*VIF*	
1	(Constant)	1.147	0.218		5.266	0.000		
	SN	0.199	0.060	0.222	3.313	0.001	0.626	1.598
	AT	0.386	0.056	0.419	6.946	0.000	0.770	1.299
	PC	0.190	0.055	0.210	3.456	0.001	0.756	1.322

a. Dependent Variable: PI. Source: Results from SPSS

Model 2: Purchase behaviour (Adjusted R^2=0.242, F=64.560, p<0.001).

5. Discussion

The findings affirm that attitude (β=0.419, p<0.001), subjective norms (β=0.222, p=0.001), and perceived behavioural control (β=0.210, p=0.001) significantly predict purchase intention, which strongly drives purchase behaviour (β=0.496, p<0.001) for safe pork in Gia Lam commune. This aligns with Ajzen's TPB, reinforcing its utility in food safety contexts. Attitude's dominance suggests a culturally rooted prioritisation of health and quality, likely amplified by Vietnam's rapid urbanisation and rising food safety awareness. Unlike subjective norms or perceived behavioural control, which rely on external cues (social pressure or access), attitude reflects an internalised belief in safe pork's superiority, consistent with studies in emerging markets where health consciousness

outpaces infrastructure development. This implies that Gia Lam consumers are motivated more by personal conviction than by social or logistical factors, a nuance that distinguishes this frontier market from developed contexts where access often overshadows intent.

Comparatively, prior research on safe food adoption in Western markets emphasises perceived behavioural control due to robust distribution networks, whereas Gia Lam's weaker effect (β=0.210) reflects limited supermarket penetration and inconsistent labelling. This study's focus on safe pork in Vietnam contributes novel insights into frontier markets, where collectivism may amplify subjective norms (β=0.222) relative to individualistic settings, yet income constraints (78% below 15 million VND) temper consumption volume. Local factors, including a collectivist tendency to trust peer recommendations and an urbanising population wary of traditional pork risks, likely shape these dynamics. Conversely, restricted access evident in the 1-3 kg weekly consumption norm (57.5%) underscores how price and availability hinder perceived behavioural control.

Theoretically, although TPB effectively captures these behavioural drivers, it exhibits some limitations when applied to the context of safe food consumption. TPB primarily relies on rational processes and planned actions, which makes it less capable of capturing affective, spontaneous, or habitual behaviour which are often highly relevant in everyday food purchase decisions. The flexibility of TPB is also constrained in complex contexts, where environmental cues, experiences, and emotions may exert stronger influences than perceived factors.

Moreover, TPB does not clearly specify the relative impact of attitudes, subjective norms, and perceived behavioural control, which may lead to prediction errors when the influence of each component varies across populations or contexts. The gap between intention and behaviour tends to widen when temporal factors are disregarded, further reducing predictive accuracy.

These limitations suggest that TPB could be strengthened by integrating the model of MGB, which accounts for emotional factors like trust in safe pork branding, or Black box models addressing subconscious such as price sensitivity. The strong Attitude-to-Intention link challenges TPB's equal weighting of constructs, suggesting a need to re-evaluate its applicability in health-driven, resource-constrained settings. Practically, producers can capitalise on this by prioritising transparent origin labelling and quality certifications to reinforce consumer attitudes, while referral programs could leverage social influence. Limited access calls for expanded distribution through supermarkets and affordable pricing strategies, addressing the gap between intention and behaviour.

These insights, however, are tempered by limitations. Self-reported data may inflate safety concerns or consumption frequency, and the cross-sectional design precludes causal inference. The sample, confined to Gia Lam commune (n=200), limits generalisability to rural or wealthier Vietnamese regions, where income and infrastructure differ. Despite these constraints, the study illuminates safe pork adoption in an urbanising frontier market, offering a foundation for longitudinal research or broader geographic comparisons.

6. Conclusions

This study reveals that attitude strongly shapes purchase intention (PI) for safe pork in Gia Lam commune, followed by subjective norms (SN) and perceived behavioural control (PBC), with PI directly driving purchase behaviour (PB). These relationships, derived from a survey of 200 respondents, underscore the primacy of health-driven beliefs in a frontier market, offering a novel application of the TPB to Vietnam's evolving food safety landscape. Unlike studies in developed markets, this work highlights how internalised priorities can outweigh access constraints in shaping consumer choices.

Theoretically, TPB proves robust in this context, affirming its cross-cultural relevance, though its emphasis on rational drivers may underexplore emotional or economic nuances. Practically, the findings signal opportunities for public health campaigns to reinforce safety perceptions and for businesses to prioritise clear labelling and urban distribution. Policymakers and producers may consider collaborating to bridge access gaps, ensuring safe pork's potential to enhance community well-being. Future research must test these dynamics longitudinally and across diverse regions to refine strategies for sustainable adoption.

CRediT author statement

Pham Thi Huong Diu: Conceptualisation, Writing - Original draft preparation, Methodology, Reviewing and Editing; Chor Sheiha: Formal analysis, Software, Writing - Original draft preparation, Data curation; Wil Martens: Reviewing and Editing.

COMPETING INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this article.

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