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Consumer Decision-Making in Livestream Agricultural Retail: Evidence from Northern Vietnam

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ABSTRACT

This study explores the determinants shaping consumers' decisions to purchase agricultural products through livestreaming in Vietnam's northern mountainous provinces-regions constrained by underdeveloped e-commerce infrastructure. The research seeks to uncover key behavioral and contextual drivers influencing online agricultural purchasing behavior. Based on 1323 valid survey responses, the study applies Partial Least Squares Structural Equation Modeling (PLS-SEM) to test seven hypothesized relationships. Results indicate that livestream timing (β = 0.415), viewer interaction (β = 0.226), livestream environment (β = 0.124), and product information (β = 0.122) exert significant positive effects on purchase decisions. In contrast, seller reputation, customer understanding, and interface intuitiveness are found to have no statistically significant impact. This research advances the theoretical understanding of consumer decision-making in the context of agricultural livestream commerce by extending existing frameworks to digital markets in low-connectivity areas. It also provides empirical insights specific to Vietnam's highland regions, where technological access and digital literacy remain limited. Practically, the findings suggest that optimizing the timing of livestream sessions, enhancing audience interactivity, and ensuring transparency and accuracy in product information can significantly improve consumer engagement and sales performance. Overall,

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this study contributes both to academic discourse on digital consumer behavior and to the sustainable development of agricultural e-commerce ecosystems in emerging rural economies.

Keywords: Digital Transformation; Livestream; Purchase Decisions; Agricultural Products; Northern Vietnam

1. Introduction

Agriculture remains a vital pillar of Vietnam's economy, both as a contributor to export growth and as the primary source of livelihood for a large share of the rural population. In 2024, according to the Vietnam Ministry of Agriculture and Environment, agricultural exports reached a record USD 62.4 billion, representing an 18.5% increase compared with the previous year [1]. While this performance underscores the sector's resilience, Vietnamese agriculture continues to face structural challenges, including fragmented supply chains, limited access to consumption markets, and difficulties in ensuring product quality and traceability. Addressing these challenges requires innovative approaches to distribution and marketing, particularly those enabled by digital technologies [2,3].

The COVID-19 pandemic served as a catalyst for digital transformation in Vietnam, profoundly altering consumer behavior and accelerating the shift from traditional markets to online platforms. According to the General Statistics Office National, e-commerce revenue was valued at approximately USD 25 billion in 2024 and is projected to surpass USD 30 billion by 2025 [4]. Within this broader transformation, livestreaming commerce has rapidly emerged as a distinctive retail format. By enabling real-time interaction between sellers and buyers, livestreaming not only enhances consumer trust but also reduces marketing costs and broadens market access. Vu's research highlights its growing significance: livestream shopping is expected to contribute up to 20% of total e-commerce sales by 2026 [5]. Among live-selling platforms, Facebook, Shopee, and TikTok stand out industry sources cite platform shares of 31.9%, 30.9%, and 17.2% respectively under AccessTrade Vietnam report [6].

For the agricultural sector, livestreaming holds particular promise as a mechanism for overcoming longstanding barriers to market access, especially in remote and mountainous regions [7,8]. By allowing farmers to showcase products directly to urban consumers, livestreaming can increase visibility, foster transparency, and generate demand for local specialties that often struggle to penetrate conventional distribution channels [9]. Nevertheless, the application of livestreaming in agriculture also presents challenges, including product quality assurance, logistics for perishable goods, and verification of origin [9,10]. These issues underscore the need for systematic research on consumer perceptions and decision-making processes in the context of livestream agricultural retail.

Despite the rapid growth of livestream commerce, scholarly research has largely concentrated on general e-commerce dynamics or agricultural supply chain modernization, with limited focus on livestreaming as a distinct sales channel for agricultural products. Existing studies are predominantly based in developed countries or major urban centers, providing little insight into rural or mountainous contexts such as northern Vietnam. Furthermore, the combined influence of financial factors such as pricing, shipping, promotions and non-financial elements such as brand trust, supplier reputation, platform credibility on livestream purchasing decisions remains underexplored. Addressing these gaps, this study provides empirical evidence on consumer behavior in livestream agricultural retail in northern Vietnam, contributing context-specific insights to an emerging field of research. This study seeks to fill this gap by examining consumer decision-making in livestream agricultural retail: Evidence from Northern Vietnam. The paper offers three main contributions. First, it advances the literature on agricultural digitalization by conceptualizing livestreaming as a distinct and innovative marketing channel, rather than subsuming it under general e-commerce. Second, it provides original empirical evidence on consumer preferences and purchasing behavior in northern mountainous provinces, a region that is often overlooked in existing studies. Third, it generates actionable insights for policymakers and agribusiness stakeholders seeking to enhance digital adoption,

improve market access, and promote the sustainable development of Vietnam's agricultural sector.

2. Literature Review and Research Hypotheses

2.1. Literature Review

2.1.1. E-Commerce and Agricultural Marketing

E-commerce has become a cornerstone of digital transformation in agriculture, serving as an important distribution channel for perishable products that require transparency, traceability, and rapid delivery. Compared with traditional markets, e-commerce platforms allow firms to access global markets, reduce transaction costs, and automate sales processes through integrated inventory and payment systems. For consumers, Loiacono et al. and Bilghian et al. certified that online retailing provides convenience by enabling quick price comparisons, personalized recommendations, and 24/7 service support, all of which contribute to higher satisfaction and loyalty [11,12].

Digital marketing tools have further strengthened the reach of e-commerce. Strategies such as search engine optimization, targeted social media advertising, and influencer marketing have been shown to enhance visibility, attract new customers, and build long-term brand engagement, especially for small and medium-sized enterprises (SMEs). Digital marketing significantly improves SMEs performance and competitiveness, facilitates SME participation in global value chains by reducing reliance on costly physical infrastructure under Sharabati research [13].

From a consumer behavior perspective, classic theories highlight the roles of perceived value, trust, and risk in shaping purchase intention. Zeithaml conceptualized perceived value as the trade-off between benefits received and sacrifices made [14], while Pavlou integrated trust and risk into the Technology Acceptance Model to explain e-commerce adoption [15]. These theoretical foundations have been widely applied in agri-food contexts, where product perishability and safety concerns heighten consumer sensitivity to information quality and credibility. Nguyen et al. showed that transparent traceability systems, seller reputation, and online feedback mechanisms play decisive roles in reducing perceived risk and strengthening consumer trust in fresh food markets [16].

In Vietnam, where agricultural products represent a major share of exports, e-commerce is emerging as a crucial mechanism for linking producers with domestic and international consumers. However, challenges remain in building consumer trust due to uneven product quality, underdeveloped logistics, and limited digital skills among farmers. Nguyen et al. and Linh et al. confirmed that trust signals such as certification, traceability, and third-party endorsements are critical to consumer willingness to buy agricultural products online [16,17]. These insights suggest that e-commerce not only expands market access but also lays the foundation for more interactive retail formats, such as livestreaming, which further enhance transparency, consumer engagement, and confidence in agricultural markets.

2.1.2. Livestreaming Commerce

Livestreaming is increasingly recognized as a disruptive innovation in digital retailing because it integrates real-time broadcasting, instant feedback, and social interaction into the shopping process. Unlike static e-commerce platforms, livestreams allow consumers to observe product demonstrations, interact with sellers, and seek clarifications in real time. This interactivity reduces product uncertainty and information asymmetry challenges that are particularly salient in the agricultural sector, where freshness, quality, and authenticity are difficult to evaluate online [18,19].

Empirical evidence confirms that livestreaming quality dimensions significantly affect consumer outcomes. Some researchers in China found that information quality, telepresence, and social presence positively influenced green trust and purchase intention for agricultural products [20]. Similarly, Wang et al. identified four antecedents of satisfaction commodity attributes, platform features, content quality, and supporting services demonstrating that both product- and platform-level factors shape consumer experiences [21].

Host characteristics are also pivotal. Xiong et al. shows that anchors' popularity, communication style,

image quality, and even voice significantly predict sales performance, as consumers perceive these cues as indicators of trustworthiness and professionalism[22]. Beyond functional attributes, the emotional dimension of livestreaming is increasingly emphasized. According Zhou et al., emotional and cognitive trust mediate the relationship between livestream features and purchase intention, emphasizing the importance of affective bonds[23]. Likewise, Tian et al. exploded rust in the streamer directly drives consumer purchase behavior, positioning host credibility as a core determinant of success[24].

The Zhao suggested that livestreaming operates not only at the dyadic level but also within a broader ecosystem. gricultural livestream commerce can be understood as a multi-actor system in which platforms, streamers, and multi-channel networks interact, generating both dynamic opportunities and risks[25]. The 'live' element itself alters consumer decision-making: demand becomes less price sensitive and engagement intensifies during live sessions, underscoring the unique temporal dynamics of this channel[26].

Taken together, these studies highlight livestreaming as more than a mere extension of e-commerce. It is a socio-technical innovation that transforms consumer evaluation processes, amplifies the role of trust and interactivity, and creates ecosystem-level shifts in agricultural marketing.

2.1.3. Consumer Decision-Making in Digital Commerce

Consumer purchase decision-making is typically modeled as a multi-stage process comprising need recognition, information search, evaluation of alternatives, purchase, and post-purchase evaluation as Kotler mentioned[27]. In digital environments, Zeithaml miniated this process is heavily influenced by perceived value and trust, where consumers assess expected benefits versus costs[14]. Livestreaming commerce transforms the conventional decision path by embedding synchronous interaction, immediacy, and social presence into consumer judgment. Empirical evidence indicates that the "live" dimension helps reduce perceived quality uncertainty and makes consumers less price sensitive during broadcast sessions[26].

In the context of agricultural livestream commerce, recent studies examine the determinants of consumer satisfaction and intention. Wang, Fang, and Pan studied livestreaming commerce of green agricultural products and identified commodity attributes, platform features, broadcast content, and supporting services as key antecedents of consumer satisfaction[21]. Zhang Huafeng and Aibdiwy explored service quality dimensions such as information quality, interaction quality, product service quality and found that perceived value mediates their impact on agricultural product purchase intention[28]. Meanwhile, Gu et al. studied in broader livestreaming features underscores the role of trust, interactivity, and platform characteristics in driving conversion[29].

While consumer perspectives dominate the literature, producer-side studies are fewer. In the agricultural livestreaming domain, adoption studies in China reveal that technical support, incentives, and peer learning communities influence farmers' willingness to engage in livestream sales[22,25]. In Vietnam, preliminary field observations suggest that skill deficits, limited broadband connectivity, and mismatches in cultural norms of consumer farmer interaction are significant barriers to smallholder adoption.

2.1.4. Factors Influencing the Comsumer Decision to Buy Agricultural Products Through Livestream

By Kotler's book, consumer decision making in digital commerce is widely explained through multi-stage models with need recognition, information search, evaluation, purchase, post-purchase[27]. This process is complemented by perceived value theory, which defines consumer judgment as a trade-off between expected benefits and costs[14], and the Technology Acceptance Model, which integrates trust and risk to explain adoption in electronic environments as Pavlou mentioned[15]. In livestream contexts, Bilgihan explained these frameworks intersect with social presence theory and cue utilization theory, which stress that real time cues, interaction, and trust signals significantly shape perceived value while reducing uncertainty[30,31]. Building on these theoretical foundations, the following hypotheses are developed.

H1: *Product information positively influences purchase decisions.*

Detailed product information mitigates uncertainty and reduces perceived risk, thereby strengthening trust and expediting consumer decision-making[15,32]. For agricultural products where freshness, safety, and authenticity are difficult to verify online certifications, nutritional information, and peer reviews are especially critical[33]. Hence, richer product information delivered via livestream is expected to positively affect purchase decisions.

H2: *Viewer interaction positively influences purchase decisions.*

According to social influence theory, observing others' engagement such as comments, likes, real-time games creates normative pressure and encourages conformity, which increases purchase intention[34]. Moreover, interactivity establishes relational bonds and enhances perceived value through co-creation[31]. Therefore, higher levels of viewer interaction are expected to strengthen consumer purchase decisions in livestream settings.

H3: *Seller reputation positively influences purchase decisions.*

Trust transfer theory posits that credibility signals such as safety certifications, professional presentation, and positive word-of-mouth are decisive in e-commerce[35,36]. Even in fast paced livestream sessions, reputation serves as a stabilizing factor that reduces perceived risk. Thus, stronger seller reputation is expected to foster consumer willingness to purchase.

H4: *Livestream environment positively influences purchase decisions.*

Grounded in social presence theory, professional and authentic environments such as farm-based broadcasting, stable streaming, high quality visuals enhance perceived presence and authenticity[37]. In agricultural livestreaming, such authenticity cues directly improve credibility and trust. Accordingly, a well designed livestream environment is hypothesized to positively influence purchase decisions.

H5: *Intuitive interface positively influences purchase decisions.*

Research on user experience shows that intuitive interfaces reduce cognitive load and enhance perceived control[38]. Livestream platforms that provide transparent features such as inventory counters, price displays, and themed designs mprove perceived usability and credibility. Hence, intuitive interfaces are expected to positively affect consumer purchase decisions.

H6: *Customer understanding positively influences purchase decisions.*

From a relationship marketing perspective, personalization and seller responsiveness build trust and satisfaction[39]. In livestream agriculture, sellers who demonstrate understanding of customer needs by providing tailored advice, seasonal recommendations, or peer usage experiences increase consumer confidence[33]. Thus, greater customer understanding is expected to positively influence purchase decisions.

H7: *Livestream timing positively influences purchase decisions.*

Temporal dynamics theory highlights that urgency and scarcity cues significantly stimulate impulsive consumption[34,40]. In livestream commerce, broadcasting during peak hours, festive occasions, or with limited time promotions induces fear of missing out, thereby driving purchase behavior. Therefore, livestream timing is hypothesized to have a positive effect on purchase decisions.

2.1.5. Research Gap

Despite the growing body of research on e-commerce and livestreaming, several limitations remain evident. First, the majority of existing studies adopt a consumer-centric lens, emphasizing drivers of purchase intention such as trust, impulsiveness, and perceived value, while offering limited integration of seller side capabilities including logistics readiness, technical competence, and content creation strategies into comprehensive models of livestream agricultural retail. Second, much of the literature is geographically concentrated in developed economies or major urban markets, providing insufficient insight into rural and mountainous

regions, such as northern Vietnam, where weak digital infrastructure, skill gaps, and distinct cultural practices may fundamentally reshape consumer behavior. Third, while ecosystem-level analyses and supply chain perspectives are emerging [25,30], relatively few studies examine how livestreaming adoption can be tailored to small-scale, experimental stages of commerce, which characterize many developing contexts. Finally, empirical research in Vietnam remains scarce, with most studies being descriptive in nature and focused on general e-commerce rather than livestreaming specifically.

To address these gaps, this study investigates consumer decision-making in livestream agricultural retail in northern Vietnam, generating context-specific evidence that reflects infrastructural constraints and local cultural factors. By doing so, it contributes both to the theoretical refinement of livestream commerce models and to the development of policy-relevant insights for promoting sustainable agricultural e-commerce in underrepresented settings.

3. Data and Methodology

To achieve the research objectives, the authors applied a quantitative approach combined with partial linear structural model analysis (PLS-SEM). First of all, the research model was built on the basis of inheriting theoretical foundations of consumer behavior, e-commerce and livestream, and at the same time adjusted to suit the specific context of the agricultural market in the northern mountainous region of Vietnam.

3.1. Data Collection

The data collection was conducted with purposive random sampling over a two-week period, from February 16 to February 28, 2025. The survey was distributed via a Google form shared on social media platforms (such as Facebook and Zalo), as well as through online communities of agricultural product consumers located in mountainous provinces of Vietnam such as Lao Cai, Tuyen Quang, Son La, Thai Nguyen, Dien Bien, Lai Chau, Phu Tho, Lang Son and Cao Bang.

A total of 1372 responses were initially obtained. After screening and removing invalid or incomplete entries, 1323 valid responses remained and were retained for subsequent analysis. The number of observed variables is 44 and according to In their pioneering book on PLS-SEM, Hair et al. discuss an alternative to the 10-times rule for minimum sample size estimation [39,41]. So with 1323 samples, the research ensures reliability with some characteristics (**Table 1**).

Table 1. Demographic characteristics.

Characteristic	Rate (%)	Characteristic	Rate (%)
1. Location		*6. Average Income*	
Lao Cai	11.04	Under 5 million VND	9.45
Tuyen Quang	11.94	From 5–10 million VND	38.70
Dien Bien	11.87	From 10–15 million VND	31.75
Thai Nguyen	10.81	From 15–20 million VND	13.30
Dien Bien	11.26	Over 20 million VND	6.80
Lai Chau	11.49	*7. Average time watching livestream per day*	
Phu Tho	10.81	Under 30 minutes	31.97
Lang Son	10.51	30–60 minutes	28.57
Cao Bang	10.28	Over 60 minutes	39.46
2. Sex		*8. Shopping frequency*	
Male	48.53	1 times/day	1.74
Female	51.47	1–3 times/week	32.05
3. Age		1–3 times/month	40.67
Under 18 years old	7.71	1–3 months/time	25.55
From 18 to 25 years old	17.91	*9. Commonly purchased agricultural products*	
25–30 years old	34.32	Fresh food (vegetables, fruits, meat, fish, etc.)	25.47
30–35 years old	28.27	Pre-processed products (frozen chicken, etc)	32.88
Over 35 years old	11.79	Processed products (braised fish, etc)	17.69
4. Job		Flour products (Rice/noodles/vermicelli)	41.27
Students	6.58	Dried agricultural products (peanuts/beans/shrimp...)	33.11
State officials	16.55	Spices from agricultural products	24.49
Company staff	21.01	Other	14.13

Table 1. *Cont.*

Characteristic	Rate (%)	Characteristic	Rate (%)
Freelance worker	32.96	*10. Average spending/time*	0.00
Housewife	8.92	Under 200,000 VND	41.27
Other	13.98	From 200,000–500,000 VND	26.15
5. Living area	-	From 500,000–700,000 VND	16.10
Urban	35.37	From 700,000–1,000,000 VND	11.04
Countryside	64.63	Over 1,000,000 VND	5.44

3.2. Methods

3.2.1. Theoretical Framework

This study develops a theoretical framework to analyze factors influencing consumers' decisions to purchase agricultural products via livestreaming, an emerging digital commerce model in Vietnam. The framework synthesizes insights from consumer behavior theory, perceived value theory, technology acceptance models, and user experience research, while adapting them to the context of agricultural livestreaming.

First, consumer behavior theory explains purchase decisions as a multi-stage process including need recognition, information search, evaluation of alternatives, purchase, and post-purchase evaluation[27]. This sequential model has been foundational for understanding how external stimuli and contextual factors shape consumer choices.

Second, perceived value theory emphasizes that consumers evaluate products as a trade-off between expected benefits and perceived sacrifices[14]. In digital commerce, this evaluation is strongly mediated by trust and perceived risk[15]. Agricultural livestreams, where product quality is difficult to verify remotely, amplify the role of transparent information, trust signals, and risk mitigation mechanisms.

Third, research on technology acceptance and e-commerce adoption highlights that trust and usability are central drivers of online purchasing[15,35]. For agricultural livestreams, these constructs manifest in the credibility of sellers, quality of interaction, and the usability of platform features.

Fourth, social presence theory underscores the importance of immediacy, authenticity, and interaction in shaping consumer perceptions[34]. Livestreaming, by enabling synchronous communication, reduces uncertainty and strengthens relational bonds, which are particularly critical for perishable agricultural products[42].

Finally, user experience and interface design models demonstrate that intuitive digital interfaces enhance perceived control, reduce cognitive effort, and increase purchase likelihood[38,43]. In livestream settings, interface elements such as stock counters, price displays, and themed layouts act as cues that strengthen credibility and engagement.

Integrating these theoretical foundations, the proposed framework identifies seven groups of factors influencing agricultural purchase decisions via livestream: (i) product information, (ii) seller reputation, (iii) viewer interaction, (iv) livestream environment, (v) platform interface, (vi) customer understanding, and (vii) livestream timing (**Figure 1**). These factors represent both informational and experiential dimensions of livestream commerce. Together, they form a comprehensive model that explains how consumers in underdeveloped e-commerce contexts such as northern Vietnam make purchasing decisions during livestream sessions.

3.2.2. Variable Description

The data collection tool is an online questionnaire, designed based on a 5-point Likert scale, including 44 observed variables belonging to 7 main groups of factors: product information, seller reputation, viewer interaction, livestream environment, platform interface, customer understanding, broadcast time, and the dependent variable is purchase decision. The scales were developed from published studies[3,15,34], and were adjusted through expert discussions to ensure appropriateness and comprehensibility for respondents (**Table 2**).

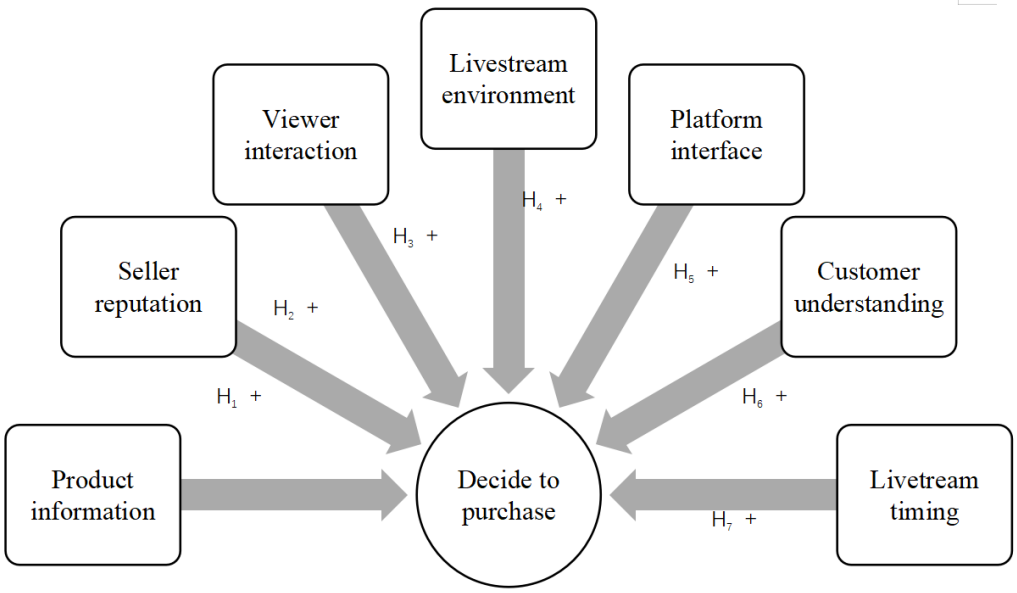

Figure 1. Theoretical framework.

Table 2. Summary of variables used in the study.

Factors	Encryption	Ballto Observe	Mean	Std.Dev
Product Information (INF)	INF1	I usually give preference to products that are well-informed.	4.45	0.68
	INF2	Information about quality certification (VietGAP, GlobalGAP, organic) affects purchasing decisions.	4.42	0.72
	INF3	Information on nutritional composition and health benefits of agricultural products is fully provided.	4.38	0.74
	INF4	Comparing the product with other products helps me make a decision easier.	4.35	0.80
	INF5	I can easily refer to product reviews and feedback from previous customers.	4.37	0.76
	INF6	Products with high sales make me feel more secure about the quality, showing that the product is very popular and should not be missed.	4.28	0.79
Seller Reputation (RE)	RE1	I have more confidence in sellers who provide food safety certificates or other quality certifications of the product.	4.46	0.74
	RE2	A professional personal photo of the seller makes a good impression.	4.26	0.75
	RE3	Pay attention to the number of followers and reviews of sellers on livestream platforms.	4.28	0.82
	RE4	Trust more sellers who are recommended or have good reviews from relatives and friends.	4.36	0.74
	RE5	Having the seller try the product directly helps me trust the product quality more.	4.35	0.75
Viewer Interact (INT)	INT1	I feel more secure when the seller the answered the questions directly.	4.38	0.73
	INT2	I am often attracted by the discounts and giveaways announced live during the live session.	4.26	0.81
	INT3	I usually stay longer on live sessions that are constantly updating with offers.	4.15	0.92
	INT4	Organizing minigames makes livestream more interesting.	4.24	0.87
	INT5	High online views mean the live session has many quality products.	4.08	0.92
	INT6	The number of likes, comments, and shares increased continuously, making me feel that the live session was attractive and not to be missed.	4.11	0.95
	INT7	I tend to buy when I see many positive comments in livestream.	4.24	0.83
Livestream environment (EN)	EN1	MA clean, tidy livestream environment helps focus more on the product.	4.40	0.68
	EN2	Stable livestream platform, no lag for better viewing experience.	4.42	0.73
	EN3	Get easily discouraged when the livestream has poor image quality or lag.	4.43	0.74
	EN4	I love livestreams that are held right on the farm or where the produce is produced.	4.24	0.86

Table 2. *Cont.*

Factors	Encryption	Ballto Observe	Mean	Std.Dev
Platform interface (UI)	UI1	Intuitive, easy-to-see livestream interface helps me find products quickly.	4.42	0.74
	UI2	I like livestreams that have information about the number of products left and the number of people who have purchased.	4.30	0.77
	UI3	Eye-catching themed interface design attracts me to buy more (Holidays, New Year, Christmas...).	4.31	0.80
	UI4	I feel the livestream is more professional when there is a price list and detailed product information.	4.46	0.71
Customer Understanding (CUS)	CUS1	I tend to choose sellers who have a good understanding of their customers' needs and preferences.	4.38	0.75
	CUS2	Preferably when the seller enthusiastically consults and answers questions about the product.	4.36	0.70
	CUS3	I appreciate when livestreams have seasonal or special occasion product suggestions.	4.28	0.76
	CUS4	I'm more interested in livestreams when there's a section where other customers share their real product usage experiences.	4.39	0.75
	CUS5	I feel more satisfied when the seller asks questions to understand my wishes clearly before consulting.	4.32	0.74
Livetream timing (TIME)	TIME1	I usually shop via livestream at fixed times.	4.02	1.04
	TIME2	I tend to shop more during holidays.	4.30	0.79
	TIME3	Livestreams held on weekends will attract more attention.	4.24	0.84
	TIME4	Peak hours make me feel like there are more people buying, which increases sales.	4.16	0.92
	TIME5	Mega livestream events create a sense of fear of missing out (FOMO), stimulating consumption.	4.26	086
	TIME6	I'm attracted to livestreams that have advance notice of broadcast times and offers.	4.28	0.80
Agricultural Purchase Decision (PD)	PD1	I usually consider carefully before deciding to buy something on livestream.	4.34	0.77
	PD2	I tend to buy a product immediately if the seller says it is out of stock.	3.94	1.12
	PD3	I usually order right in the livestream instead of coming back to buy later	4.09	0.95
	PD4	I am willing to spend more than expected when shopping on livestream.	4.01	1.10
	PD5	I may change my mind and not make a purchase if the livestream is too long or lacks necessary information.	4.32	0.77
	PD6	I often decide to buy on livestream when I see many other people also order.	4.02	1.10
	PD7	I tend to buy products on livestream even if I don't intend to buy them initially.	3.97	1.10

3.2.3. Analytical Methods

Livestream commerce has become an important retail channel, especially for products that require high levels of information transparency and consumer trust such as agricultural goods. To analyze complex consumer decision-making processes in this context, Partial Least Squares Structural Equation Modeling (PLS-SEM) has been widely adopted. PLS-SEM is variance-based, prediction-oriented, and particularly useful when models involve both reflective constructs such as trust, perceived value, engagement and formative constructs (such as information quality, platform interactivity[44]. It is robust to non-normal data and effective with small to medium sample sizes, making it well suited for livestream studies where data often comes from survey-based research[45]. Recent methodological advances emphasize reporting measurement model quality using reliability indices, convergent and discriminant validity, and predictive performance via PLS predict[46].

Empirical research confirms that PLS-SEM is effective for explaining purchase behavior in livestream commerce. Chen et al. found that social presence significantly enhances consumer identification and purchase intention in livestream e-commerce[47]. Similarly, Zhang et al. showed that interactivity and visibility affordances influence engagement and intention to buy[45,48], while Ashraf demonstrated that trust mediates between livestream platform features and reuse intention[46,49]. In addition, Ramadhoni and Prassida identified that perceived value strongly drives engagement and purchase intention in livestream social commerce[47]. Together, these studies illustrate that PLS-SEM enables researchers to capture the mediating and predictive mechanisms underlying

consumer decision-making. For agricultural livestream retail, where authenticity, product freshness, and traceability are critical, PLS-SEM offers a rigorous approach to assess how information quality, social presence, and trust interact to shape purchase intentions.

Partial Least Squares Structural Equation Modeling (PLS-SEM) is a second-generation multivariate analysis technique used to test complex theoretical models, especially when data are non-normal or sample sizes are small. The method involves two main stages: the measurement model and the structural model evaluation. Key tests in PLS-SEM include: factor loadings (≥0.7) to assess indicator reliability; composite reliability (CR) (≥0.7) and average variance extracted (AVE) (≥0.5) for convergent validity; Fornell-Larcker criterion and HTMT ratio (<0.85) for discriminant validity; and VIF (<5) to check multicollinearity. The R^2 value measures the explanatory power, while SRMR (<0.08) indicates model fit. Bootstrapping is used to test the significance of path coefficients (t-value > 1.96, $p < 0.05$). Together, these indices ensure reliability, validity, and predictive accuracy of the proposed model [44].

4. Results

4.1. PLS-SEM Results

4.1.1. Assessment of the Reliability of Variables

To evaluate the reliability of the observed (measured) variables, the study employed the factor loading coefficients (outer loadings) derived from the measurement model. These coefficients indicate the strength of the relationship between each observed variable and its corresponding latent construct. Conceptually, in SmartPLS4, the outer loading can be interpreted as the square root of the absolute value of the coefficient of determination (R^2) obtained from the linear regression of the latent construct on the observed variable.

Following data refinement, the results of the Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis conducted using SmartPLS4 revealed that all outer loadings exceeded the threshold value of 0.70 (see **Table 3**). This indicates that each observed variable demonstrates a high level of reliability and is suitable for inclusion in the measurement model, in accordance with established guidelines in the literature.

4.1.2. Assessment of Reliability and Convergence of the Scale

The reliability of the scale is assessed through two main indexes: Cronbach's Alpha and Composite Reliability (CR). Cronbach's Alpha is a traditional reliability measure, while Composite Reliability is more commonly used in PLS-SEM analysis. To ensure reliability, both indexes need to reach a value of 0.7 or higher. The analysis results show that most of the component scales have Cronbach's Alpha and CR greater than 0.7 (**Table 4**). Although the Product information variable has a Cronbach's Alpha coefficient < 0.7, according to Hair et al., Cronbach's Alpha is a traditional reliability assessment index but has some limitations, especially in measurement models with reflective constructs [39,44]. This index tends to underestimate the true reliability of the scale due to the assumption that all observed variables contribute equally to the latent concept. Therefore, CR is recommended to provide a more accurate estimate of the reliability of the scale in PLS-SEM analysis. The scale can still be considered reliable when Cronbach's Alpha < 0.7 with CR > 0.7; especially if AVE > 0.5, indicating the convergence of observed variables to the measurement concept. From this, it can be seen that the Product information scale still ensures reliability, which shows that the scales of the study are all very good.

Table 3. Factor loading test.

	CUS	EN	INF	INT	PD	RE	TIME	UI
CUS1	0.840							
CUS2	0.716							
CUS3	0.792							
CUS4	0.799							
CUS5	0.768							
EN1		0.800						
EN2		0.767						
EN4		0.858						

Table 3. *Cont.*

	CUS	EN	INF	INT	PD	RE	TIME	UI
INF3			0.784					
INF4			0.843					
INT3				0.797				
INT4				0.784				
INT5				0.782				
INT6				0.843				
INT7				0.779				
PD2					0.856			
PD3					0.800			
PD4					0.857			
PD6					0.888			
PD7					0.861			
RE2						0.776		
RE3						0.810		
RE4						0.765		
RE5						0.726		
TIME1							0.777	
TIME3							0.771	
TIME4							0.837	
TIME5							0.743	
TIME6							0.753	
UI1								0.850
UI3								0.888
UI4								0.787

Table 4. Reliability and convergent validity of the scale.

	Cronbach's Alpha	Composite Reliability (Ar)	Composite Reliability (Cr)	Average Variance Extracted (Ave)
Product Information (INF)	0.844	0.856	0.888	0.615
Seller Reputation (RE)	0.747	0.801	0.850	0.654
Viewer Interact (INT)	0.492	0.498	0.797	0.662
Livestream environment (EN)	0.857	0.859	0.897	0.636
Platform interface (UI)	0.772	0.785	0.853	0.593
Customer Understanding (CUS)	0.836	0.845	0.884	0.603
Livetream timing (TIME)	0.800	0.845	0.880	0.710
Agricultural Purchase Decision (PD)	0.906	0.909	0.930	0.728

In SmartPLS4, the convergence of the scale is assessed based on the average variance extracted (AVE). According to Cheal et al., a scale is considered to have convergent validity when the AVE is 0.5 or higher. The threshold of 0.5 (equivalent to 50%) shows that the average parent latent variable will explain at least 50% of the variation of each observed variable. The AVE analysis results in **Table 3** show that the scales in the study all meet this criterion, ensuring convergence.

4.1.3. Assessment of the Discriminative Power of the Scale

Discriminant validity reflects the degree of difference between a construct and other constructs in the model. To evaluate this criterion, the study uses the Heterotrait-Monotrait (HTMT) index. According to Henseler et al., the discriminant validity of a factor is violated if the HTMT index of that pair of factors exceeds 0.9. If the HTMT index is less than 0.85, the discriminant validity is well guaranteed. Thus, the range from 0.85 to 0.9 is acceptable. The results from **Table 5** show that most of the HTMT values are much smaller than the threshold of 0.85. Although there is still an HTMT index between the variables Seller reputation (RE) and Viewer interaction (INT) of 0.859, Livstream timing (TIME) and Viewer interaction (INT) of 0.891, Livstream timing (TIME) and Purchase decision (PD) of 0.893, which is larger than the threshold of 0.85, these indexes are still within the acceptable range, the discrimination of the scale is still guaranteed.

Table 5. Test of discriminant validity of the scale.

	CUS	EN	INF	INT	PD	RE	IME
EN	0.648						
INF	0.412	0.365					
INT	0.707	0.672	0.482				
PD	0.601	0.606	0.495	0.835			
RE	0.824	0.591	0.517	0.859	0.738		
TIME	0.844	0.675	0.492	0.891	0.893	0.850	
UI	0.713	0.557	0.390	0.634	0.539	0.707	0.596

4.1.4. Assessment of Multicollinearity Problems

Hair et al. proposed threshold values of variance inflation factor (VIF) to assess multicollinearity [39,41]. The research results using the VIF of the scale showed that all independent variables had VIFs less than 3 (**Table 6**). Therefore, according to Hair et al., it can be concluded that the model does not have multicollinearity [39,41].

Table 6. Variance inflation factor.

Independent Variable	VIF
CUS →PD	2.652
EN → PD	1.917
INF →PD	1.345
INT →PD	2.192
RE → PD	2.577
TIME →PD	2.504
UI → PD	2.134

4.2. Discussion

The study used the bootstrapping procedure with 5000 resamples to test the significance of the path coefficients. The results are presented in **Table 7**. Out of the seven proposed relationships, four were found to be statistically significant at the 1% level. All significant coefficients were positive, which indicates that increases in the independent variables lead to corresponding increases in the dependent variable, Purchase decision (PD). The order of influence from strongest to weakest was: Livestream timing (TIME, $\beta = 0.415$, $p < 0.001$), Viewer interaction (INT, $\beta = 0.226$, $p < 0.001$), Livestream environment (EN, $\beta = 0.124$, $p = 0.039$), and Product information (INF, $\beta = 0.122$, $p = 0.034$). These findings highlight that urgency, interactivity, and transparent information are the primary elements shaping consumer choices in livestream agricultural retail.

Table 7. Test of coefficient significance.

	Basic Sample	Sample Mean	Standard Deviation	*t*-Statistics	*p*-Values
CUS → PD	− 0.117	− 0.110	0.076	1.554	0.120
EN → PD	0.124	0.119	0.060	2.066	0.039
INF → PD	0.122	0.111	0.053	2.119	0.034
INT → PD	0.226	0.229	0.065	3.504	0.000
RE → PD	0.108	0.110	0.069	1.560	0.110
TIME → PD	0.415	0.417	0.069	5.993	0.000
UI → PD	0.053	0.048	0.067	0.800	0.424

In contrast, the remaining three variables Customer understanding (CUS, $\beta = -0.117$, $p = 0.120$), Seller reputation (RE, $\beta = 0.110$, $p = 0.110$), and Platform intuitiveness (UI, $\beta = 0.053$, $p = 0.424$) were not statistically significant. Notably, Customer understanding even displayed a negative coefficient, suggesting an opposite direction of influence than expected, though without significance. This outcome implies that in the context of livestream shopping, consumer behavior tends to be more impulsive and less guided by personalized relevance, reputation cues, or the technical design of the platform. Instead, consumers appear to rely on immediate triggers such as time-based promotions, interaction with sellers, and the credibility of information provided

during the livestream session.

Livestream timing (TIME) was the most influential predictor of purchase decisions. measures the alignment of the session with consumer availability and promotional urgency. It was the most influential predictor ($\beta = 0.415$, $p < 0.001$), showing that consumers are especially responsive during peak hours or seasonal campaigns. This highlights the critical role of urgency, peak hours, and time-based promotions in shaping consumer behavior. Previous studies in digital commerce have emphasized the importance of temporal dynamics in online purchase decisions, where consumers often respond to scarcity or limited-time offers[41]. In the agricultural context, this is particularly relevant because promotions tied to harvest periods, Tet, or local festivals can significantly increase demand. Data from the Vietnam's Ministry of Agriculture and Rural Development supports this finding, showing that livestreams conducted during peak times consistently generate higher revenues[2].

Viewer interaction (INT) was the second strongest predictor which measures the degree of real-time communication between buyers and sellers. This variable had a strong positive effect ($\beta = 0.226$, $p < 0.001$), indicating that answering questions and engaging with viewers enhances consumer confidence and stimulates purchasing. This underscores the role of real-time two-way communication between sellers and buyers in enhancing trust and engagement. Following this point, Zhang et al. demonstrated that interactivity in livestreams improves sales effectiveness by allowing sellers to respond to consumer questions and feedback in real time, thereby increasing confidence in the product[32,34]. This aligns with Social Influence Theory, which posits that social cues and peer presence shape consumer decisions in highly interactive environments.

Livestream environment (EN) also had a significant positive effect, confirming the importance of social presence and atmosphere in livestream shopping. This variable was positive and significant ($\beta = 0.124$, $p = 0.039$), showing that when livestreams are conducted at farms or authentic production sites, consumers are more likely to trust the product. Similar with this results, Zhang et al. found that a strong social presence promotes impulse buying by creating authenticity and emotional connection[45,48]. In agricultural livestreams, hosting sessions at farms or production sites enhances transparency and provides consumers with a sense of "being there," which builds trust in product quality. This finding resonates with Social Presence Theory, suggesting that the feeling of being connected to the producer can reduce perceived uncertainty.

Product information (INF) eflects the clarity and completeness of product details, such as certifications or nutritional values. It was significant ($\beta = 0.122$, $p = 0.034$), confirming that consumers pay attention to verifiable information before deciding to buy. This result was emphasized by Pavlou that detailed and accurate product information reduces perceived risk and enhances consumer trust in e-commerce environments[15]. This study confirms that the same logic applies to livestream agricultural retail, where quality certifications (e.g., VietGAP, GlobalGAP), nutritional information, and health benefits reassure consumers and increase their likelihood of purchasing. Providing transparent and verifiable product information is thus essential for farmers and sellers aiming to build credibility and encourage purchase intentions.

Surprisingly, Seller reputation (RE) refers to ease of navigation on the platform, but it was not significant ($\beta = 0.053$, $p = 0.424$). This problem was showed by Falahat et al. which identified reputation as a key determinant of consumer trust[34,36]. The result suggests that in livestream contexts, consumers prioritize dynamic and interactive elements over static reputation signals. One possible explanation is the prevalence of counterfeit or low-quality products on online platforms, which may have eroded the influence of seller reputation. As a result, consumers rely more on real-time authenticity cues provided during the livestream.

Customer understanding (CUS) was also non-significant and negatively signed. The coefficient was negative ($\beta = -0.117$, $p = 0.120$), suggesting that tailoring content to customer knowledge did not significantly improve purchase decisions. This diverges from the expectation that sellers tailoring their content to consumer needs would increase purchase likelihood. Instead, it appears that purchases during agricultural livestreams are often spontaneous and driven by promotions and

emotional engagement, rather than carefully considered needs. This aligns with recent findings in impulse buying literature, which highlight that immediacy often overrides rational evaluation in livestream settings.

Finally, Platform intuitiveness (UI) refers to ease of navigation on the platform, but it was not significant ($\beta = 0.053$, $p = 0.424$). While user-friendly design is often emphasized in e-commerce research, in the case of livestream shopping, consumers appear more influenced by the interaction with the seller and the appeal of the content itself. This suggests that the visual and communicative aspects of livestreams outweigh the technical aspects of the platform interface, at least for agricultural products.

Grouping the variables, four factors were statistically significant: TIME, INT, EN, and INF. These results confirm that dynamic and trust-enhancing elements dominate livestream shopping decisions. For example, the coefficient for TIME (0.415) is almost double that of INT (0.226), indicating that urgency and timing effects are more decisive than interaction alone. In Vietnam, this aligns with market practices: agricultural livestreams conducted during evening hours or tied to festivals such as Lunar New Year often generate much higher transaction volumes, as consumers perceive limited opportunities and rush to purchase fresh produce. Similarly, INT (0.226) reflects the cultural preference for interpersonal trust: when sellers answer questions directly on air, consumers feel reassured, especially for perishable items like fruits and vegetables where quality cannot be judged solely by images. EN (0.124) and INF (0.122), though smaller, remain important. For example, livestreams from authentic farm sites in Bac Giang, Lao Cai or Son La not only showcase the environment but also display VietGAP or GlobalGAP certificates, which consumers interpret as reliable signals of quality.

By contrast, three variables were not statistically significant: RE, CUS, and UI. RE (0.110) suggests that past seller reputation is less critical in livestream contexts, likely because many Vietnamese consumers have experienced fraudulent sellers on large platforms and therefore rely more on live demonstrations than static reputation cues. CUS (−0.117) indicates that personalized content does not strongly drive decisions; instead, purchases are often spontaneous, motivated by promotions and social excitement rather than deep product knowledge. UI (0.053) shows that technical features of the platform are secondary—buyers focus on content and engagement, not interface design.

5. Conclusion

This study investigated consumer decision-making in agricultural livestream retail in Vietnam, focusing on the northern mountainous provinces. Using PLS-SEM analysis of 1323 valid responses, the results confirmed that four factors significantly and positively affect purchase decisions: livestream timing, viewer interaction, livestream environment, and product information. In contrast, seller reputation, customer understanding, and interface intuitiveness were not statistically significant. These findings highlight the unique behavioral patterns of Vietnamese consumers, who prioritize immediacy, authenticity, and transparency in livestream shopping rather than relying on static signals such as brand reputation or technical design.

Theoretically, the research enriches the understanding of digital agricultural commerce by extending consumer decision-making models to livestream contexts. While previous e-commerce studies emphasized reputation and platform usability, this study shows that in livestream retail, dynamic real-time cues such as timing and interactivity are more decisive. This contributes to refining the conceptual boundary between livestreaming and traditional online commerce and suggests that authenticity and transparency are key theoretical dimensions for analyzing agricultural digitalization.

From a practical perspective, several value-driven solutions emerge. First, optimize timing strategies: sellers should schedule livestreams during peak evening hours, weekends, or cultural events such as Tết and harvest festivals to maximize consumer engagement. This leverages the demonstrated effect of urgency and availability on purchase decisions. Second, enhance interactivity: livestream hosts should actively respond to comments, integrate polls or games, and offer instant promotions to maintain attention and build consumer trust. Such engagement replicates traditional market in-

teractions in digital spaces and strengthens buyer confidence. Third, create authentic environments: broadcasting directly from farms, cooperatives, or local markets not only differentiates sellers but also conveys transparency. Incorporating certifications such as VietGAP, GlobalGAP and on-site demonstrations of freshness helps consumers verify quality in real time. Fourth, improve product information disclosure: beyond basic descriptions, sellers should provide nutritional details, storage guidelines, and usage suggestions, thereby aligning with consumer demand for safe, healthy, and traceable food. These practices can enhance value perception and reduce risk concerns.

At the policy level, the results suggest that government agencies should support farmers and cooperatives by providing training programs on digital marketing, livestream skills, and customer interaction techniques. Moreover, platforms and local authorities could collaborate to establish verification systems for agricultural livestreams, ensuring that sellers meet minimum standards of product authenticity and labeling. This would strengthen consumer trust and reduce fraud. Finally, developing regional livestream hubs equipped with stable internet, professional equipment, and logistic connections would allow small farmers in disadvantaged areas to participate more effectively, thereby narrowing the digital divide.

While these findings contribute valuable insights, the study is limited by its reliance on a regional sample and cross-sectional data. Future research should expand to urban and rural comparisons, adopt longitudinal approaches, and integrate multi-stakeholder perspectives including farmers, platforms, and policymakers. Comparative studies across Southeast Asia would also help situate Vietnam's experience within broader regional trends.

In summary, agricultural livestream retail in Vietnam is shaped primarily by immediacy, engagement, authenticity, and information transparency. By implementing solutions such as optimized timing, enhanced interactivity, authentic broadcasting environments, and improved product information, farmers and sellers can significantly increase consumer trust and sales performance. At the same time, policy support in training, verification, and infrastructure will be essential to sustain growth. Livestreaming therefore offers not only a tool for boosting short-term sales but also a strategic pathway for modernizing Vietnam's agricultural sector and fostering inclusive digital transformation.

Limitations and Future Research

Despite its contributions, this study is not without limitations, which also provide directions for future research.

First, the sampling method relied on convenience and purposive techniques, which may introduce sampling bias and limit the representativeness of the findings. Future studies should adopt random or stratified sampling approaches to ensure broader coverage and enhance external validity.

Second, the study employed a cross-sectional research design, capturing consumer perceptions at a single point in time. This restricts the ability to establish causal relationships among variables. Subsequent research could apply longitudinal or experimental designs to explore changes in consumer behavior and verify causal pathways over time.

Third, the geographical scope of the study was limited to the northern mountainous provinces of Vietnam, where digital infrastructure and consumer profiles may differ from other regions. Expanding future analyses to include urban, coastal, and southern provinces, or even cross-country comparisons within ASEAN, would provide more comprehensive insights into livestream agricultural retail.

Fourth, future research could integrate qualitative approaches—such as interviews or focus groups—to deepen the understanding of farmers' and sellers' perspectives, complementing quantitative findings. By addressing these limitations, forthcoming studies can further enrich the theoretical framework of agricultural livestream commerce and enhance its practical applications for sustainable rural development.

Finally, Although this study focuses on domestic livestream agricultural commerce, potential U.S. tariff adjustments on Vietnamese agricultural exports may indirectly influence domestic consumption and farmer welfare. Such trade measures could alter export incentives, depress farm-gate prices, and accelerate produc-

ers' reliance on digital retail channels such as livestreaming to maintain income stability. While empirical data on these impacts are not yet available, future research should assess the economic and behavioral consequences of international trade shifts for Vietnam's agricultural digitalization, providing a more comprehensive understanding of market adaptation under evolving global trade conditions.

Author Contributions

L.N.-T.T. conceptualized the research framework, designed the survey instrument, and supervised data collection. Q.P.-N.-H. contributed to the literature review, theoretical model development, and statistical interpretation of results. N.N.-T.-M. participated in data analysis, validation of PLS-SEM outputs, and refinement of the methodological section. M.D.-T. served as the corresponding author, leading the manuscript drafting, integration of results, critical revisions, and final approval of the submitted version. All authors read and approved the final manuscript.

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Informed Consent Statement

Informed consent was obtained from all participants involved in the study. Participation was entirely voluntary, and respondents were informed about the purpose of the research, the confidentiality of their responses, and their right to withdraw at any time without penalty.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to privacy and ethical restrictions, individual respondent data cannot be publicly shared.

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Conflicts of Interest

The authors declare no conflict of interest.

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