

Live Streaming Marketing in the E-Commerce of Fashion SMEs

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Abstract: - This study examines the impact of live streaming marketing on e-commerce for fashion SMEs in Peru. Its main objective is to analyze how dimensions such as live streaming, product, and field scope influence key e-commerce variables, including customer service, personalization, word of mouth, and website service quality. A quantitative, non-experimental, explanatory research design was employed. Data were collected through a structured questionnaire administered to employees of fashion SMEs. Structural equation modeling (SEM) was used to evaluate the relationships between live-streaming marketing dimensions and e-commerce outcomes. The results indicate that live streaming marketing has a positive and significant influence on service quality, personalization, customer service, and electronic word of mouth. These findings highlight the importance of real-time interaction and personalization as key drivers of customer engagement, improved experience, and enhanced competitive advantage in the digital environment.

Key-Words: - Live streaming marketing, E-commerce, SMEs, Fashion, Customer experience, Personalization, Electronic word of mouth, Service quality, Customer service system, Purchase intention.

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1 Introduction

The fashion industry in Peru has experienced steady growth over the past few decades, becoming a key driver of the national economy, according to the official Bicentennial newspaper. [1] reports that the textile industry contributes between \$4 billion and \$5 billion to GDP each year. Despite market challenges and changes in consumer preferences, fashion companies have managed to adapt to an increasingly globalized environment. In this context, e-commerce has become significantly important, transforming the way brands interact with their customers and expand their reach. In 2022, the online fashion market was estimated at \$744.5 billion globally, with projections to exceed \$1.2 trillion over the next five years, underscoring the importance of digitalization in this sector, [2].

E-commerce has posed new challenges for traditional marketing strategies, as companies must balance their operations between physical and digital commerce. Integrating marketing tools across both channels is essential to manage inventory and logistics processes efficiently, avoiding duplicate costs and optimizing services in both environments, [3]. In a world where international business is increasingly digitized, companies are forced to adapt to technological transformation to remain competitive. This is clearly evident in the growing

adoption of digital stores, which allow companies to reach new markets and improve their operational efficiency. Peru has been identified as the fastest-growing e-commerce market in Latin America, with a projected compound annual growth rate of 35% between 2023 and 2026. Building on this trajectory, the number of online buyers has expanded significantly, with digital commerce now reaching nearly half the Peruvian population, [4].

For retail companies, e-commerce has become an essential tool that enables them to use more cost-effective resources to track supply and demand, thereby optimizing the customer experience, [5]. However, the vast number of options on digital platforms can create an overwhelming shopping experience for users. For this reason, it is essential to implement recommendation systems based on consumer behavior analysis, which facilitates navigation and improves the shopping experience, [6].

The impact of e-commerce on fashion intensified during the pandemic, forcing many companies to accelerate their digital transformation. As a result, tools such as chatbots and live streaming platforms have established themselves as key elements in the interaction between brands and consumers, especially in the retail sector, [7]. Chatbots allow queries and transactions to be

managed automatically, improving customer service efficiency.

Live Streaming has emerged as a new form of digital marketing that has revolutionized e-commerce. This tool has become an important sales channel in the fashion industry, especially during the pandemic, when impulse buying and trust in real-time interaction have been shown to impact purchase intent significantly, [8]. This "live commerce" approach combines entertainment and shopping, giving rise to the concept of "shoppertainment," which creates more immersive and engaging experiences for users, [9].

Live streaming platforms allow brands to connect with their consumers in a more personal way, while streamers play a crucial role in creating a unique experience. They not only promote products but also entertain and create an emotional bond with viewers, which positively influences their purchasing decisions, [10]. Trust in streamers is essential to encourage participation on these platforms, so marketers must focus on strengthening the credibility and visual communication of the products being promoted, [11].

The evolution of information and communication technologies (ICT) has been key to the growth of e-commerce and live Streaming. These technologies have transformed commercial interactions, allowing companies to reach a wider audience through digital platforms. This phenomenon has opened up new opportunities and business models that continue to evolve, driving dynamic growth in the global fashion industry, [12]. Digitalization has reshaped the dynamics of interaction between fashion brands and consumers, enabling more adaptive engagement strategies in response to evolving market conditions and emerging consumption patterns.

Thus, marketing through live Streaming has proven to be an effective strategy for encouraging consumer purchase intent. This is due to its ability to generate greater social presence and conformity among customers, factors that positively influence their purchasing decisions, [13]. In addition, live streaming technology not only captures the audience's attention and strengthens trust in brands but also provides transparency and direct feedback, reinforcing the credibility of companies, [14]. The study setup, the personnel involved, and the presentation style and procedures are key elements that attract consumers and can be optimized through further research and development in this field, [15].

Despite the international advancement of live-streaming marketing, there is a significant theoretical gap in analyzing its application in

emerging markets. Studies conducted in Asia have demonstrated strong effects on purchase intent, social presence, and trust. However, their validity is not automatic in contexts where digital capabilities, organizational resources, and e-commerce structures differ. [16] models derived from highly digitized ecosystems cannot be transferred without a process of conceptual adaptation, as SMEs in developing countries operate under technological, logistical, and cultural constraints that alter the dynamics of engagement and decision-making.

Similarly, Latin American literature on interactive marketing still has gaps regarding how consumers interpret interactivity, presenter credibility, and the digital atmosphere under conditions of lower technological maturity, [17]. These differences suggest that the model cannot function as a simple replica, but rather as a proposal tailored to the particularities of the Peruvian market, where live Streaming fulfills additional functions related to trust, risk reduction, and operational customization.

Based on this, this study articulates a critical synthesis that combines international findings with the specificities of the local ecosystem, delimiting its scope, conceptual tensions, and adaptation needs. This integration allows us to justify the relevance of the proposed model and position it as a contextualized contribution to the analysis of e-commerce in Peruvian SMEs.

2 Hypothesis Development and Related Literature

The proposed model is based on recent developments in live commerce and the evolution of e-commerce in the fashion sector. The specialized literature shows that live Streaming combines techno-social, affective, and commercial elements that transform the shopping experience, integrating attributes of the presenter, product characteristics, and environmental stimuli specific to the format.

Recent studies agree that live commerce is supported by a broad set of determinants, ranging from real-time interaction to emotional narrative and perceptions of trust, so its analysis requires a diverse conceptual framework. Table 1 summarizes some of the evidence supporting the selection of the constructs used in this study, following the tradition of structural research characterizing contemporary e-commerce.

This background shows that live commerce is structured around three widely recognized groups of variables: the characteristics of the live broadcaster,

the attributes of the Product, and the environmental or atmospheric stimuli that frame the broadcast.

Table 1. Previous studies and methods were used for the model dimensions

Model dimension	Authors	Method
Transmitter professionalism	[8]	SEM (Structural equation modeling)
Transmitter popularity	[12]	Bibliometric analysis (CiteSpace)
Product quality	[18]	SEM
Product price	[5]	Econometric models
Product practicality	[3]	Conceptual analysis
Entertainment (Atmosphere)	[19]	Systematic review
Transmitter interactivity	[20]	PLS-SEM
Promotion (Atmosphere)	[11]	SEM
Emotion (Atmosphere)	[8]	SEM
Personalization	[6]	Machine learning models
Electronic word of mouth	[11]	SEM
Website perception/quality	[7]	Interdisciplinary review

Source: created by the authors

Rather than replicating prior findings, the present study integrates these perspectives to test whether established live commerce determinants maintain their explanatory power in an emerging-market context characterized by lower digital maturity and different organizational capabilities.

Each of these dimensions has been empirically validated in research on the fashion industry and live commerce, and their joint articulation enables us to explain perceptions of the website, the effectiveness of the customer service system, the appropriateness of recommendations, and the impact of electronic word of mouth. On this basis, the hypotheses and related literature for each construct are developed below.

2.1 Live Streamer

Live streamers have established themselves as a decisive element in real-time video-based e-commerce models. Their importance lies in their ability to combine informative, social, and persuasive functions that replace physical contact with the Product. In one of the most recent studies on purchase intent in live broadcasts, [8] explains that the presenter's credibility serves as a

mechanism to reduce the uncertainty inherent in the digital environment. This type of professionalism creates a psychological security framework that users need when evaluating a product without physical interaction.

Another determining factor is the broadcaster's popularity. [14] argue that popularity acts as a cognitive shortcut: a large audience provides signals of social validation that facilitate the transfer of trust to the platform. In highly saturated sectors such as online fashion retail, this accumulated visibility directs attention and lends legitimacy to the content presented.

Finally, interactivity is the feature that distinguishes live commerce from other digital formats. [12] in their analysis of scientific advances in commercial Streaming, they show that real-time interaction through questions, requested demonstrations, and immediate responses creates a sense of social proximity, increasing the perceived authenticity of the broadcaster. This interaction not only sustains attention but also increases the user's willingness to accept recommendations and trust the platform.

Professionalism, popularity, and interactivity define the influence of the live broadcaster and explain their impact on evaluative dimensions such as site quality, customer service, personalization, and electronic word of mouth.

This is demonstrated in hypotheses H1-H4. The live broadcaster significantly influences the quality of the website's service, customer service system, personalization, and electronic word of mouth.

2.2 Product

The evaluation of a product in fashion e-commerce depends largely on how it is presented during transmission. Product quality, understood as the perception of materials, durability, and aesthetic consistency, is formed from visual and narrative cues provided in real time. [3] they argue that perceived quality in digital fashion relies on descriptive accuracy, image clarity, and the broadcaster's ability to show details that replace physical inspection.

Price takes on an interpretive role within streaming. [5] they explain that the perception of price in intensely competitive environments is strengthened when contextualized through explanations, comparisons, and live demonstrations, facilitating the evaluation of product value and reducing information asymmetry.

Practicality, defined as the usefulness of the Product in everyday contexts, remains a central criterion in decision-making. In a study on

purchasing behavior in digital fashion [18], they point out that perceived usefulness is a key determinant, especially when the consumer lacks tactile references and relies entirely on audiovisual demonstrations.

The joint strengthening of these dimensions—quality, price, and practicality—promotes faster, more reliable evaluations, thereby increasing perceptions of the site's efficiency, the relevance of the care system, and the consistency of personalized recommendations.

This is why hypotheses H5-H8 are proposed. Product characteristics significantly influence the quality of the website's service, the care system, personalization, and electronic word of mouth.

2.3 Field Scope

The atmosphere generated during a live broadcast shapes the emotional, visual, and narrative environment where the viewer's experience unfolds. This construct is composed of three interrelated elements: entertainment, promotion, and emotion, which function as environmental stimuli that mold the consumer's perception.

Entertainment has positioned itself as a fundamental factor in the rise of shoppertainment. A systematic review on live commerce [19] highlights that visual dynamics, narrative rhythm, and the spontaneity of the transmitter transform the purchase into a playful experience, increasing the user's permanence and their openness to commercial information.

Promotion takes on a strategic role within the live format. [8] the promotional stimuli presented during the broadcast, offers, launches, and special collections generate perceptions of opportunity and scarcity that increase the urgency to buy, especially for fashion products.

Emotion represents the subjective dimension of the digital environment. [11] they show that the affective responses generated by the broadcaster's narrative strengthen the transfer of trust towards the platform. At the same time [12], they identify the emotional dimension as one of the most influential factors for viewer retention.

These three dimensions do not function in isolation; they are integrated into a unified atmosphere that simultaneously influences the evaluation of the site, the perception of the support, and the user's willingness to share recommendations.

Therefore, the 4 hypotheses from H9 to H12. The scope field significantly influences the quality of the website service, the support system, personalization, and electronic word of mouth.

For this study, a structural model focused solely on direct relationships between constructs was chosen, prioritizing parsimony and suitability for contexts with limited empirical evidence. This approach is consistent with methodological recommendations for research seeking to establish essential links before incorporating more complex mechanisms such as mediation or moderation, [13]. This decision was also supported by the exploratory nature of the study and the limited empirical evidence available in emerging markets, where establishing primary structural relationships represents a necessary first step before testing more complex mediation or moderation mechanisms. Previous live commerce studies have incorporated indirect effects; however, the present research prioritizes model parsimony and theoretical clarity to avoid over-specification in an underexplored context. This design also reduces structural redundancy derived from testing multiple parallel indirect effects with equivalent theoretical direction.

The Stimulus-Organism-Response (SOR) approach was adopted, which maintains that environmental stimuli activate internal evaluations that ultimately guide user behavior. In the context of e-commerce and live Streaming, elements such as the presenter's performance have been identified as stimuli capable of influencing viewers' affective and cognitive responses, which in turn impact their perception of the platform, [6].

In addition, recent literature shows that the broadcast atmosphere also serves as a stimulus that shapes the user's experience and behavioral disposition in digital environments, [8]. Within this framework, the proposed structure provides a clear theoretical basis, adaptable to consumer behavior in Peruvian SMEs, where live interactions generate dynamics that justify the model.

3 Methodology

First, the choice of PLS-SEM is justified by the model's and the dataset's characteristics. The study involves multiple latent constructs and simultaneous paths, which require a prediction-oriented approach suitable for moderate-sized samples. Furthermore, preliminary analyses showed non-normal distributions in several variables, making a variance-based method more appropriate than a covariance model. Recent research recommends using PLS when the goal is to maximize predictive capacity, and the statistical assumptions of CB-SEM are not fully met, [19].

Furthermore, this research has an explanatory level and a non-experimental design, meaning that

no variables were deliberately manipulated; rather, the phenomena were observed as they occurred in their natural context, [21]. This methodological decision was made because the main objective was to understand how live-streaming marketing influences e-commerce for fashion SMEs in Peru without altering the real business environment. The quantitative method employed involves collecting numerical data and analyzing it using statistical procedures, with the aim of testing previously formulated hypotheses and establishing general patterns of behavior, [22]. This approach allows for maintaining objectivity throughout the study and for controlling potential biases and errors in the research process, [22].

For data analysis, methods and models such as confirmatory factor analysis (CFA) were used to assess the construct's reliability with a pilot test. Based on this, information was gathered to develop a structural equation model (SEM), a statistical technique that combines factor analysis and multiple regression, [19]. SEM is widely used to test and develop theories by applying nested models and sequential chi-square difference tests, [19], [23]. This technique is fundamental for analyzing relationships among latent variables, employing correlation, covariance, multiple regression, and path analysis, [19], [24].

The instrument used for collecting quantitative data was a structured survey using a Likert scale, as recommended in [21], [22] for quantitative studies. This questionnaire included eight questions related to the Live Streaming Marketing variable, distributed across three dimensions: two items for the Live Streamer dimension, three for the Product dimension, and three for the Field-Scope dimension. The E-commerce variable was assessed using 9 questions distributed across the dimensions of Website Service Quality (1 item), Customer Service System (3 items), Personalization (3 items), and Electronic Word-of-Mouth (2 items).

In the website service quality dimension, a single item was used because visual appearance is a concrete, direct attribute that users can easily evaluate. Recent studies support the use of single-item measurements when the content is specific and does not require decomposition into multiple facets. [25] indicates that for clearly defined attributes, single items are sufficient and valid. [26] confirms that this type of measurement is appropriate when the item's interpretation is unambiguous for the respondent. Furthermore, [27] demonstrates that, in sensory perceptions or immediate impressions, such as the visual evaluation of digital interfaces, a single item can adequately represent the construct. These

contributions support the methodological decision adopted in this study.

Structural analysis, used as part of the methodology, is a key approach that allows a system to be broken down into its essential components, enabling the understanding of their relationships and facilitating the identification of the most relevant factors that influence its functioning or the impact on another variable, [19], [24].

In summary, this study aims to determine how live-streaming marketing strategies affect e-commerce for SMEs in Peru. To this end, both a general hypothesis and specific hypotheses are proposed to analyze better and understand the collected information.

General hypothesis

- The use of live-streaming marketing has a positive impact on e-commerce for fashion SMEs.

Specific hypotheses

- Live Streaming has a positive influence on the quality of service of the website of fashion SMEs.
- Live Streaming has a positive influence on the customer service system of fashion SMEs.
- Live Streaming has a positive influence on the personalization of fashion SMEs.
- Live Streaming has a positive influence on electronic word-of-mouth marketing for fashion SMEs.
- The Product has a positive impact on the quality of service on the websites of fashion SMEs.
- The Product has a positive influence on the customer service system of fashion SMEs.
- The Product has a positive influence on the personalization of fashion SMEs.
- The Product has a positive influence on electronic word-of-mouth marketing for fashion SMEs.
- The field or scope of action positively influences the quality of service of the website of fashion SMEs.
- The field or scope of action has a positive influence on the customer service system of fashion SMEs.
- The field or scope of action positively influences the personalization of fashion SMEs.
- The field or scope of action positively influences the electronic word of mouth of fashion SMEs.

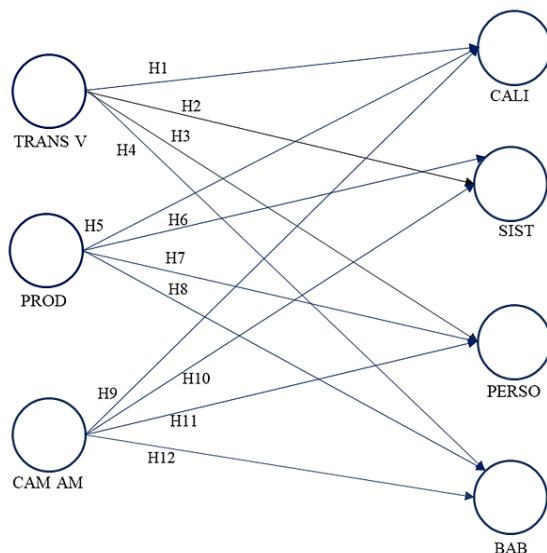


Fig. 1: Conceptual model and hypothesis.
Source: created by the authors

Figure 1 shows the relationship between the conceptual model and the hypotheses. In this case, the left side shows the dimensions of live-streaming marketing, and the right side shows the dimensions of e-commerce, with each dimension explained by its corresponding hypotheses.

The computational workflow underlying Figure 1 follows an iterative PLS-SEM estimation process, in which latent variable scores are calculated via repeated partial least squares regressions until convergence criteria are met. The estimation includes bootstrapping resampling procedures to assess path significance, as well as sequential evaluation of measurement and structural model quality indicators (AVE, HTMT, VIF, R^2 , f^2 , and Q^2). This process reflects the model's computational complexity, combining iterative optimization and predictive validation steps.

For the research, Table 2, presents the abbreviation used to characterize each dimension, facilitating a clearer process and a more effective understanding of the tables.

Exclusion and inclusion criteria

Exclusion

Participants who did not perform functions related to the digital environment were excluded. Only one informant per company was considered to broaden the coverage of SMEs and avoid duplicate responses within the same organization.

Inclusion

Workers responsible for digital marketing, e-commerce, or content management in SMEs in

Peru's fashion sector with national reach were included.

Ethical considerations

Before administering the questionnaire, all participants were informed about the study's objectives, confidentiality, and the anonymous use of the collected data. Participation was voluntary, and written informed consent was obtained. No sensitive personal data was collected, and the study was reviewed and approved by the relevant institutional ethics committee, complying with international ethical standards for social research. The primary data were stored in a secure folder and used only for academic purposes.

Data analysis

Data analysis was conducted in several stages to ensure the instrument's reliability. First, a confirmatory factor analysis (CFA) was performed. This analysis showed that the items met the recommended statistical criteria for inclusion in the model. CFA allows comparison of the construct defined by a theoretical model with the evaluated instrument, thereby revealing whether each item contributes significantly to its respective construct, [23], [28].

Table 2. Description, assessment, and abbreviation of the variables of the structural model.

Variable	Description of variables	Grades	Abbreviation
Y1	Website service quality	Rating from 1 to 5	Cali
Y2	Customer service system	Rating from 1 to 5	SYSTEM
Y3	Personalization	Rating from 1 to 5	PERSON
Y4	Electronic word of mouth	Rating from 1 to 5	BAB
X1	Live broadcast	Rating from 1 to 5	TRANS V
X2	Product	Rating from 1 to 5	PROD
X3	Field	Rating from 1 to 5	CAM AM

Source: created by the authors

Secondly, the model used was Partial Least Squares Structural Equation Modeling (PLS-SEM), a second-generation multivariate statistical method designed to explore and confirm causal relationships between different constructs or dimensions. Therefore, it does not rely on the assumption of normality and is robust to collinearity. The fact that the survey data are categorical does not pose a problem for their processing. Furthermore, since the dimensions are not directly measured, this statistical

method allows each observation of the dimensions to be included in latent variables. These same variables allow analysis of their effects on other latent variables corresponding to the dimensions of the dependent variable, [28]. Within the PLS-SEM framework, regression coefficients, bootstrapped t-statistics, and significance testing were employed, providing analytical functions equivalent to traditional statistical procedures such as regression testing and variance-based evaluation.

For the respective data processing and analysis, a measurement model must first be designed. This model involves modeling the latent variables based on their observations, using a formative approach. This model is then validated by assessing convergence, collinearity, significance, and the relevance of the observations used to measure the latent variables. Subsequently, after validating the measurement model, a structural model is designed to account for interactions among the measured latent variables. Finally, to validate these results, the collinearity, significance, and relevance of the latent variables within the structural model are evaluated.

Structural equation modeling, a multivariate statistical analysis technique, was used to analyze how each dimension of the "Live Streaming Marketing" variable affects the dimensions of the "E-commerce" variable. Based on this, closed-ended surveys were administered via simple random sampling. These surveys were given to 214 employees or collaborators from various small and medium-sized enterprises (SMEs) in Peru.

Structural analysis is a technique used to identify patterns and relationships within collected data. It is a key phase in research, as it allows for the design and validation of the structure of the dimensions being studied, as well as determining whether this structure is suitable for the objectives set out in the study. In this way, structural analysis helps to validate or reject the formulated hypotheses, bringing rigor and clarity to the research process, [28].

Evaluation of the measurement model

In this evaluation, the structural model shows us the external loadings, which identify how much each item contributes to the latent construct. It is expected that these loadings will always be greater than 0.7 to improve model acceptance. However, if they are below this value, it could indicate that the item does not accurately represent the latent variable under study. Additionally, we have the convergent value, represented by AVE (Adjustable Value of Variance). This value is directly reflected in the variables, which, in this case, are the dimensions. It

measures the proportion of variance in the construct's indicators that the construct explains relative to the total variance. An AVE greater than 0.5 indicates adequate convergent validity, meaning that the items are well-related to the construct they measure. It should be noted that our model is a reflective structural model. Results such as Cronbach's Alpha will help us validate internal reliability, which measures how consistent the items are in measuring the same variable. A value of 0.7 or higher is considered acceptable for the analysis. Table 3 presents the results obtained, where both the external loadings per item and the AVE, Cronbach's Alpha, Rho_a, and Rho_c comply with the standards; the instrument is accepted and valid.

Table 3. Internal consistency, reliability, and convergent validity

Variable	Item Code	Item	External Loads	BIRD	Cronbach's alpha	Rho _a	Rho _c
TRANS V	PO1	Popularity 1	0.881	0.774	0.708	0.708	0.872
	PO2	Popularity 2	0.878				
PROD	AC	Quality	0.871	0.693	0.78	0.794	0.871
	PRA	Practicality	0.819				
	PRE2	Price 2	0.806				
CAM AM	EM	Emotion	0.803	0.684	0.77	0.784	0.866
	IN	Entertainment	0.815				
	PRO MO	Promotion Visual	0.862				
	AP	Appearance	1.000				
SYSTE M	TO THE	Payment options	0.849	0.668	0.751	0.756	0.858
	COM P	Price comparison	0.779				
	TRA	Transaction	0.822				
PERSO N	PREI N	Individual Preferences	0.81	0.675	0.76	0.762	0.862
	VEN ADI	Additional Sale	0.84				
	VEN CRU	Cross-selling	0.815				
BAB	Cali	Star rating	0.868	0.794	0.744	0.764	0.885
	RELI	Online Reviews	0.914				

Source: created by the authors

Discriminant Validity

Discriminant validity is a test that ensures the constructs measured in a study are truly conceptually distinct. In other words, it verifies that a measurement tool is measuring something unique and not duplicating what another tool or dimension

measures. This is important because if two supposedly distinct constructs are highly related, it could mean they are not actually so conceptually different, which would affect the study's validity. To assess this, the heterotrait-monotrait ratio (HTMT) is used. An HTMT value below 0.85, or even 0.90 (which is acceptable), indicates that the constructs are sufficiently different. Table 4 shows the HTMT values for several constructs (BAB, CALI, CAM AM, PERSO, PROD, SIST, TRANS V). The results indicate that all HTMT values are less than 0.90, and most are below 0.85. Although some relationships, such as SIST-CAM AM (0.892) and SIST-PROD (0.891), approach the limit, they do not exceed it. This suggests that, in general, the measurement instrument used in the study meets the requirement for discriminant validity. This means the items being measured are conceptually distinct and not redundant, thereby strengthening the study.

Table 4. Discriminant validity: Heterotrait-monotrait relationship (HTMT)

	BA B	Cali	CA M AM	PERSO N	PRO D	SYSTE M	TRAN S V
BAB							
Cali	0.71 1						
CAM AM	0.66 6	0.62 9					
PERSO N	0.84 8	0.64 9	0.75 4				
PROD	0.73 9	0.59 9	0.81 1	0.749			
SYSTE M	0.82 1	0.75 1	0.89 2	0.82	0.89 1		
TRANS V	0.71 8	0.62	0.67 8	0.696	0.85 4	0.802	

Source: created by the authors

Table 5 presents the Fornell-Larcker criterion. Here, the diagonal values represent the square roots of the AVEs for each construct. For discriminant validity to be met, each of these values must be greater than the correlations of the corresponding construct with the other constructs. Since the square root of the AVE for each construct is greater than its correlations with the others, the Fornell-Larcker criterion for discriminant validity is met.

Taken together, the results from both tables suggest that the measurement instrument used in the study demonstrates discriminant validity, thereby strengthening confidence in the conclusions.

Table 5. Discriminant validity: Fornell-Larcker criterion

	BA B	Cali	CA M AM	PERSO N	PRO D	SYSTE M	TRAN S V
BAB	0.89 1						
Cali	0.61 1	1.00 0					
CAM AM	0.51 5	0.55 8	0.82 7				
PERSO N	0.64 4	0.56 8	0.58	0.822			
PROD	0.57 4	0.54	0.63 7	0.582	0.83 3		
SYSTE M	0.61 6	0.65 3	0.69 2	0.614	0.69 4	0.817	
TRANS V	0.52 5	0.52 2	0.50 4	0.511	0.64 1	0.585	0.88

Source: created by the authors

Collinearity

Another important assumption to consider when estimating a structural model is the absence of collinearity among the components used to measure each formative latent variable. Collinearity, also known as multicollinearity, occurs when two or more variables used to predict a phenomenon are highly correlated. This means that one variable can be predicted from the others. To determine whether collinearity exists, the Variance Inflation Factor (VIF) is used. The VIF indicates how much the variance of a result is inflated by collinearity.

It is necessary to verify that there is no excessive collinearity among the predictor variables. If $VIF < 5$, there is no collinearity problem, and if $VIF > 5$, it indicates severe collinearity, in which case the instrument would have to be eliminated or modified. Collinearity makes it difficult to determine the importance of each variable and can render the model unreliable. Therefore, it is important to detect it.

Table 6 shows the Variance Inflation Factor. Low values indicate little collinearity. All VIFs are below 2. This means there are no serious collinearity problems among the variables. Each variable is contributing different information to the model.

Table 7 shows the strength of the relationships between the variables. High T- statistic values (>1.96) indicate a real and reliable relationship. Almost all T-statistic values are very high, suggesting strong, significant relationships. For example, the relationship between "AL" and "SIST" has a T-statistic of 44.339, suggesting that when "AL" changes, "SIST" changes predictably. Furthermore, the relationship between "RELI" and

"BA B" is the strongest in the table, with a T-statistic of 75.849. The "n/a" value for the relationship between "AP" and "CALI" simply indicates that no statistically significant relationship was found between these two variables. Given that the T- stat values of the other relationships are high and the VIF values are low, the absence of a significant relationship between "AP" and "CALI" does not compromise the overall validity of the construct or model; this must be because there is only one item in the CALI dimension.

Table 6. VIF (variance inflation factor) for each measured variable

Live Streamer		
PO1	PO2	
1.428	1.428	
Customer service system		
TO THE	COMP	TRA
1.626	1.422	1.521
Personalization		
PREIN	COME AND ADI	COME CRU
1.502	1.571	1.533
Electronic word of mouth		
Cali	RELI	
1.539	1.539	
Website service quality		
AP		
1.000		
Product		
AC	PRA	PRE2
1.797	1.477	1.692
Field-Scope		
EM	IN	PROMO
1.479	1.645	1.635

Source: created by the authors

Table 7. Meaning and relevance of the measure for each latent variable

T Stat.	T Stat.	T Stat.	T Stat.
AL <- SIST	44.339	PRE IN <- PERSO	26.12
AP <- CALI	n/a	PRE 2 <- PROD	27.12
CA <- PROD	48.966	PROMO <- CAM AM	59.426
CALI <- BAB	31.797	RE LI <- BAB	75.849
COMP <- SIST	19.19	TRA <- SIST	34.863
EM <- CAM AM	30.670	COME ADI <- PERSO	35.902
EN <- CAM AM	29.968	VEN CRU <- PERSO	29.840
FOR <- PROD	33.970		
PO 1 <- TRANS V	47.16		
PO 2 <- TRANS V	47.915		

Source: created by the authors

4 Results

As shown in Table 7, a diagram below specifies everything related to the calculation of the formative and structural measurement model. The variables Live Streaming (TRANS V), Product (PROD), and Field or Scope (CAM AM) are dimensions of the Live Streaming Marketing variable. In contrast, the variables Website Service Quality (CALI), Customer Service System (SIST), Personalization (PERSO), and Electronic Word-of-Mouth (BAB) are dimensions of E-commerce. The model shows that the diagram shown in Table 7 is the result of an evaluation of the structural model using partial least squares. Given that the assumptions of the measurement and structural models were previously validated, the interpretation of the model presented in Table 7 remains valid.

Table 8. Results of the Structural Model analysis.

Hypothesis	Path	Path coefficients	t-statistics	p-values
H1	TRANS V -> CALI	0.246	3.282	0.001
H2	TRANS V -> SIST	0.175	3.111	0.002
H3	TRANS V -> PERSO	0.181	2.145	0.032
H4	TRANS V -> BAB	0.232	2.748	0.006
H5	PROD -> CALI	0.178	2.112	0.035
H6	PROD -> SIST	0.333	5.133	0
H7	PROD -> PERSO	0.26	2.609	0.009
H8	PROD -> BAB	0.289	2.973	0.003
H9	CAM AM -> CALI	0.321	4.530	0
H10	CAM AM -> SIST	0.392	7.585	0
H11	CAM AM -> PERSO	0.323	4.812	0
H12	CAM AM -> BAB	0.214	3.144	0.002

Source: created by the authors

These findings extend prior live commerce research by showing that environmental broadcast factors play a stronger relational role in emerging-market SMEs, suggesting that emotional atmosphere may substitute for technological maturity. The magnitude of the standardized coefficients suggests that environmental broadcast factors contribute more strongly to customer service and website perception. At the same time, product attributes and live transmission play complementary roles in explaining personalization and electronic word of mouth.

Estimated paths remain statistically significant ($p < 0.05$) and consistent with the proposed structural model. Table 8 summarizes the path coefficients and significance values for each hypothesis.

Coefficient of determination R²

Table 9 presents the R² values, revealing the capacity of live-streaming marketing dimensions to explain the variability in e-commerce dimensions. The model explains 40.3% of the variability in website service quality, suggesting that live streaming marketing strategies have a significant influence on how customers perceive the quality of the online platform. Customer service is the dimension best explained by the model, with an R² of 0.604, indicating that the implemented marketing strategies account for 60.4% of its variability. Personalization shows an R² of 0.431, indicating that 43.1% of the variability in personalized customer experiences is explained by live-streaming marketing dimensions.

Finally, while important, electronic word-of-mouth is only explained by the model at 39.8%, suggesting that factors beyond live-streaming marketing also influence how customers talk about the brand online. Taken together, these results indicate that the dimensions of live streaming marketing have a significant impact on e-commerce, although to varying degrees depending on the dimension analyzed

Table 9. R² values

	R-squared	adjusted R-squared
Website service quality	0.403	0.395
Customer service system	0.604	0.599
Personalization	0.431	0.423
Electronic word of mouth	0.398	0.389

Source: created by the authors

The R² values obtained reflect a moderate explanatory power, which is common in applied research where digital behavior is influenced by multiple external factors specific to each organization. In predictive models, these levels remain useful as long as the proposed relationships are consistent with the theoretical framework and statistically significant.

Therefore, the results should be interpreted as a first explanatory approximation rather than as a closed, confirmatory model, as recommended for predictive models, [28].

F2 effect size

The F2 indicator allows us to evaluate how much each independent variable contributes to explaining a dependent variable in the model; that is, how important a relationship is within the structural system. If removing a variable from the model significantly decreases the R², then its F2 will be higher. According to [29], an F2 value above 0.02 is considered small, greater than 0.15 is moderate, and greater than 0.35 is large. Table 10 shows that the CAM AM-SIST relationship has a moderate effect (F2 = 0.224), suggesting that the Scope Field dimension has a considerable influence on the customer service system. Other relationships, such as PROD-SIST (0.128) and PERSO-CAM AM (0.106), show small effects but remain relevant for explaining the model's dynamics. These results help us understand the relative strength of each relationship in the model; that is, which variables are driving the changes in the dependent variables the most. According to [30], this analysis complements the path coefficients and provides a deeper view of the model's internal structure.

Table 10. F2 Values

	BA B	Cali	CA M AM	PERSO N	PRO D	SYSTE M	TRAN S V
BAB							
Cali							
CAM	0.04	0.1		0.106		0.224	
AM	4						
PERSO							
N							
PROD	0.06	0.02		0.054		0.128	
SYSTE	3	4					
M							
TRANS	0.05	0.05		0.033		0.044	
V	1	8					

Source: created by the authors

Prediction coefficient Q²

The Q² value assesses whether the model can predict new values; that is, whether it not only

explains what has already happened but can also anticipate what might occur. A positive value indicates the model has predictive power; a negative value indicates it does not. In other words, if the value is greater than 0, the model is approved; otherwise, it is not approved. Table 11 presents the values that reflect how well the model predicts the dependent variables. All values are positive, meaning the model has predictive capacity. The highest value corresponds to SIST ($Q^2 = 0.59$), indicating a high level of predictive performance. The other dimensions (PERSO, CALI, and BAB) are also within acceptable ranges, above 0.35, suggesting moderate predictive power. These results validate that the model not only explains relationships but can also be used to project the future behavior of e-commerce variables for the analyzed SMEs. As [31] explains, ideally, the model should not only fit the data with which it was trained but also anticipate results for new observations.

Table 11. Q^2 Values

	Q^2_{predict}	RMSE	MAE
BAB	0.371	0.801	0.6
Cali	0.379	0.798	0.636
PERSON	0.406	0.782	0.58
SYSTEM	0.59	0.647	0.511

Source: created by the authors

Although several effect sizes obtained in F2 fall within small ranges, this magnitude is consistent with models where multiple predictors act simultaneously. [32] points out that, in multivariate structures applied to digital environments, individual effects tend to be diluted because user behavior depends on the combination of stimuli and not on isolated influences. Likewise, [33] explains that in interactive marketing studies, it is common for each predictor to contribute a moderate amount of variance, even when the full model is statistically robust.

Regarding the high values in some HTMT indices, these reflect conceptual proximity between dimensions derived from the same theoretical framework. According to [34], when several constructs represent complementary aspects of the same digital experience, a certain degree of overlap is to be expected without compromising discriminant validity, provided that the values remain within acceptable limits, as is the case in the present study. Table 12 presents the full results of the structural model.

Table 12. Results of the structural model analysis

Hypothesis	β	Decision
H1: TRANS V $\rightarrow$ CALI	0.246	Accepted H1
H2: TRANS V $\rightarrow$ SIST	0.175	Accepted H2
H3: TRANS V $\rightarrow$ PERSO	0.181	Accepted H3
H4: TRANS V $\rightarrow$ BAB	0.232	Accepted H4
H5: PROD $\rightarrow$ CALI	0.178	Accepted H5
H6: PROD $\rightarrow$ SIST	0.333	Accepted H6
H7: PROD $\rightarrow$ PERSO	0.26	Accepted H7
H8: PROD $\rightarrow$ BAB	0.289	Accepted H8
H9: CAM AM $\rightarrow$ CALI	0.321	Accepted H9
H10: CAM AM $\rightarrow$ SIST	0.392	Accepted H10
H11: CAM AM $\rightarrow$ PERSO	0.323	Accepted H11
H12: CAM AM $\rightarrow$ BAB	0.214	Accept H12

Source: created by the authors

5 Discussion

This study analyzed how live-streaming marketing affects the e-commerce of small- and medium-sized fashion enterprises in Peru. As shown in Figure 2 (Appendix), which presents the structural model of live streaming marketing and e-commerce, the evaluated dimensions of live streaming marketing have a significant effect on key variables in the digital environment, aligning with recent research that real-time interaction generates an immediate emotional connection with viewers. For example, [35] indicates that emotional responses and instant visual connections are decisive factors in consumer evaluation during live streams. In this study, this mechanism helps explain why live Streaming is associated with higher levels of perceived personalization and a greater willingness of users to share recommendations online.

The analysis also confirmed the relationships between the dimensions of live-streaming marketing and the components of e-commerce, providing strong evidence of convergent validity. In particular, the Live Broadcaster dimension reinforces the idea that the presenter's authenticity, charisma, and communicative clarity trigger trust. This aligns with the findings of [20], who, from a Theory of Planned Behavior-based approach, conclude that the presenter's credibility and ability to generate an emotional connection directly influence purchase intention. In the Peruvian case, these results suggest that the broadcaster fulfills a key relational role, acting as a bridge between the user and a brand that, in many cases, does not yet enjoy widespread recognition in the digital environment.

In the second dimension, Product, the results show that consumers express a greater purchase intent when the presentation is clear, attractive, and accompanied by dynamic visual content. This pattern aligns with studies using big data and deep learning techniques, which demonstrate that live-

streaming marketing performance improves when the Product is displayed interactively, visually, and immersively on e-commerce platforms. The way in which product details, textures, or uses are showcased reduces uncertainty and facilitates the purchase decision. Furthermore, the Product's visual presentation had a significant impact on the dimensions of personalization and online word-of-mouth marketing. This finding aligns with recent research, such as that of [20], whose authors, working in the tourism sector, highlighted that both the way the Product is presented and the role of the communicator directly influence the activation of purchase intent. Although their study takes place in a different context, the logic is fully applicable to the fashion sector, where aesthetics, visual storytelling, and the way the Product is displayed play a decisive role in the consumer experience.

The dimension related to the broadcast environment showed the strongest effect on variables such as customer service and perceived website quality. This result aligns with [36], who analyzed how the interactions among brands, platforms, presenters, and consumers shape an ecosystem that determines the performance of live-streaming marketing. In the context of SMEs, this interdependence becomes even more relevant, since any element of the broadcast environment can enhance or limit the effectiveness of the digital strategy. This decision also avoids structural redundancy generated by modeling multiple parallel paths with identical directional logic, prioritizing theoretical clarity over model complexity. This study intentionally focused on direct relationships to maintain a parsimonious structure suitable for an emerging market context. Future research may extend the model by incorporating indirect pathways that capture more complex behavioral dynamics once empirical evidence becomes more consolidated in Latin American environments.

Furthermore, the incorporation of advanced digital tools has been shown to improve business performance. Recent studies demonstrate that adopting smart technologies optimizes real-time customer service and enhances personalization during the purchase decision process. Along these lines, integrating artificial intelligence-based systems, such as chatbots and recommendation engines, increases the effectiveness of live-streaming marketing, [37]. The results of this study show a similar trend.

It is important to recognize that this analysis was conducted in a developing country, where technological adoption and digital consumption dynamics are still in transition. As [38] points out,

much of the available evidence on e-commerce comes from developed countries, creating a geographical bias that limits our understanding of how these tools function in less digitally mature environments. In this sense, studying the behavior of Peruvian consumers and businesses provides relevant insights into how live Streaming is perceived, evaluated, and incorporated into purchasing processes, highlighting the need to adapt digital strategies to heterogeneous business realities. In this context, the results show that fashion SMEs can benefit significantly from incorporating live Streaming into their business strategy, as this dynamic helps strengthen customer relationships, improve the shopping experience, and increase brand visibility. This behavior aligns with [39], who reported that live Streaming is transforming e-commerce practices by combining interaction, closeness, and a more community-oriented experience for young consumers. Although supported by prior methodological literature, the use of a single-item indicator of website service quality may not fully capture its multidimensional nature, which should be considered when interpreting the findings.

However, the literature also warns that the balance between information and entertainment is crucial for the format's effectiveness. While the concept of shoppertainment has gained popularity for its ability to attract audiences and boost online purchases [40], some studies indicate that an excess of entertainment elements can dilute the commercial message and decrease product understanding, [41]. In the Peruvian case, the findings suggest that live-streaming marketing has a positive impact. However, its effectiveness may vary by cultural factors, consumption habits, and users' levels of digital literacy.

6 Conclusions

First, the findings of this study demonstrated that live streaming marketing, across its various dimensions, positively influences e-commerce, a valuable tool for fashion SMEs in an increasingly digital world. This has not only been a strategy for strengthening and building more meaningful, stable relationships with clients and consumers, but also for boosting business performance in the digital environment. Furthermore, integrating live streams into e-commerce platforms has improved web service quality, personalization, customer service efficiency, and brand visibility through digital word-of-mouth marketing.

Analyzing the various dimensions of live-streaming marketing reveals that the presenter's role, how the Product is showcased, and the broadcast context significantly influence key e-commerce success indicators, especially in the fashion sector. Consumers trust those presenting the products, and the clarity with which the benefits and features are communicated is crucial for capturing and maintaining audience attention. Furthermore, the ability to interact in real time and have questions answered instantly contributes to a more personalized and satisfying shopping experience, generating immediate value and a competitive advantage when making a purchase decision.

The use of statistical analyses, such as confirmatory factor analysis (CFA) and structural equation modeling, enabled the identification of strong relationships among the variables, supporting both the general and specific hypotheses. This reinforces the idea that live-streaming marketing has a real, positive impact on the digital performance of fashion SMEs.

On the other hand, the study underscores the importance of adapting digital strategies to the specific characteristics of the local market, given the increasingly digital nature of international business. It is therefore crucial that companies consider the region's cultural characteristics and consumption habits to connect authentically and effectively with their audience. Digitalization must be tailored to the specific market context being analyzed. In this sense, digitalization and the intelligent use of new technological tools emerge as key strategies and opportunities for companies in the fashion sector not only to face the challenges of the competitive environment but also to grow and differentiate themselves from the competition.

The evidence obtained in this research makes it clear that integrating live streaming marketing into e-commerce is much more than a positive impact; it is a necessity for fashion SMEs that seek to constantly innovate and adopt new ways of doing business, thereby strengthening their digital presence and building stronger relationships with their customers in a market that is constantly evolving and ready to react to change.

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APPENDIX

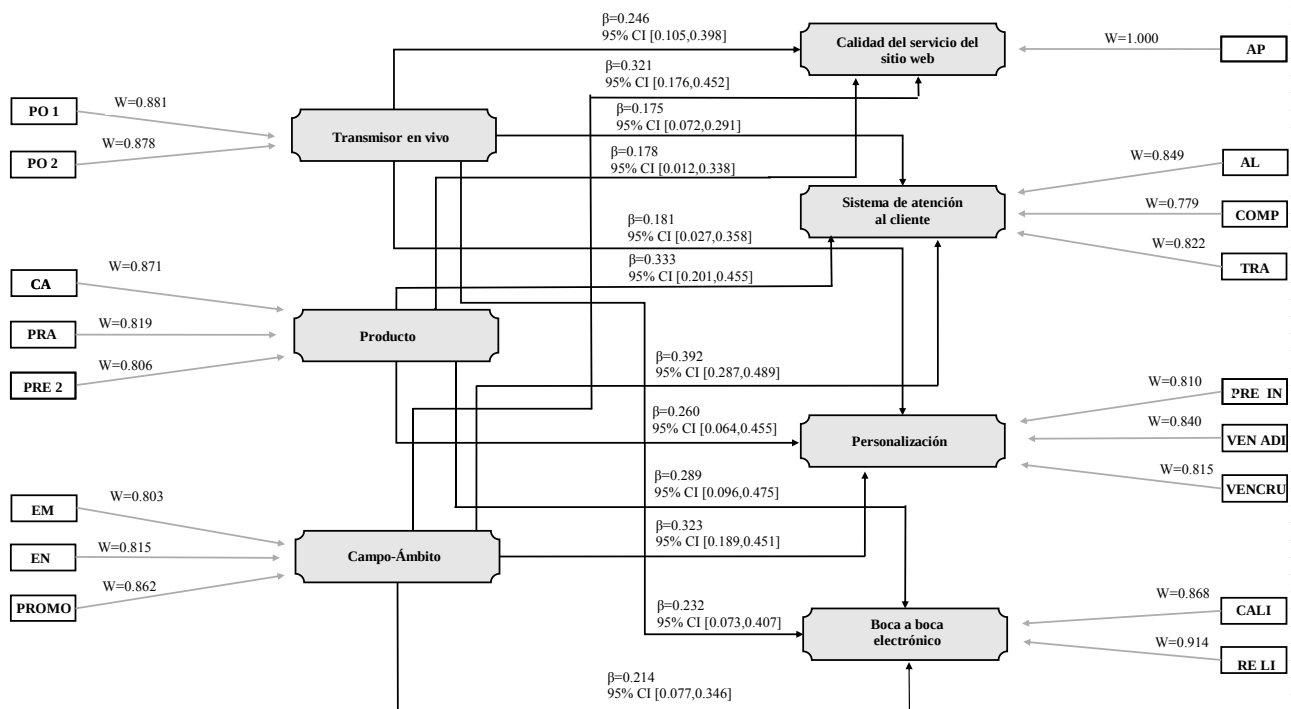


Fig. 2: Structural model of live Streaming and e-commerce marketing

Source: created by the authors