

The Online Celebrity and its Impact on the Live Streaming Performance: The Moderating Role of Product Type

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… Abstract …

With the rapid development of live streaming commerce, the online celebrity as an information source plays a critical role in affecting the live streaming performance. However, the impact of different product types on the relationship between the online celebrity and the live streaming has been less researched. Based on the elaboration likelihood model (ELM) and information source theory, this paper aims to empirically study the factors influencing sales of live streaming commerce and the moderating role of product type on the relationship between them. The analysis of 11422 live streaming data collected from October 10, 2021 to February 10, 2022 shows that multi-channel network (MCN) and followers positively affect sales volume of live streaming commerce, while the reputation score harms the sales. Moreover, the moderating effect of the ratio of low involvement product on the relationships has also been confirmed. The findings enrich the literature on live streaming commerce performance and the implications and limitations of the research have been discussed.

Key Words : Online celebrity, Live streaming performance, Information source, Elaboration likelihood model, Product involvement

I . Introduction

Live streaming has gained popularity over the recent years, and it has become a new trend to empower online sales (Bruce et al., 2018). In

China, live streaming users have reached 617 million, and live e-commerce is expected to quickly penetrate the consumer and online shopping markets with a 10.6 percent penetration rate in the online shopping

retail market in 2020. Brands and retailers such as Burberry and Starbucks believe that live streaming shopping is the new trend and thus promote their marketing campaigns via live streaming channels (Wongkitrungrueng and Assarut, 2020). Before the Covid-19 pandemic, many brands used live streaming just as an extension of their means to expand their influence, but nowadays, they are starting to see live streaming as "a must-have" of their marketing campaigns.

Although live streaming commerce has created an explosive sales record, not all online celebrities can equally be successful in attracting viewers and performing well. Compared with traditional e-commerce, live streaming commerce enables consumers to make more informed decisions. Consumers make their purchasing decisions by relying on more trustworthy information (Luo et al., 2021). Therefore, the online celebrity and its characteristics, as the performer and information source, may directly influence whether the consumers are willing to watch their live streaming or to purchase the products. To figure out how the factors influence the live streaming performance, previous

studies have adopted the information source theory to empirically test the theory and hypotheses with different methods and data such as surveys, interviews, and secondary transaction data (Luo et al., 2021). However, the extant literature neglects the potential impact of product type on the way how the online celebrity's characteristics affect the sales performance of live streaming commerce. To address the gap, this paper borrows insight from the elaboration likelihood model (ELM). The ELM assumes that an attitude change may result from different information-processing mechanisms, and the personal attitude formation and change may take central and peripheral routes (Petty, R.E. and Cacioppo, J.T., 1984). Factors influencing this route include the association of individual recipients, i.e., whether the type of product is high or low involvement. The product type will affect which route an individual considers more important during the information processing process. The investigation of product type can provide additional implications regarding how this specific product characteristic can moderate the effect of the online celebrity on viewers' behaviors. Most

previous studies mainly focus on the characteristics of the online celebrity and ignore the characteristics of the product. Therefore, this paper will explore how the product type moderates the impact of host characteristics on live streaming sales based on the ELM model.

This study developed a research model to investigate the effects of three peripheral route factors for the online celebrity on live streaming sales and integrated the product type into the ELM framework as a moderator. Our contribution has the following two points. First, we make up for the gaps in live streaming-related research, enriching the research content and theories adopted. In addition, the study based on the ELM model expands the use of the ELM model and enriches the use of models related to live streaming. Second, more and more hosts have joined the live streaming industry, and the competition has become more and more fierce. The dividends of the entire mobile Internet have subsided, and the traffic growth rate is slowing down. Under such circumstances, rationally using the resources they have and how to make further improvements are extremely important. We hope to provide targeted

suggestions for sellers and hosts through this research.

II. Theoretical

Background and Model

1. E-commerce Live Streaming

“Live streaming + E-commerce ” is an innovative marketing model launched by the e-commerce platform, characterized by high interactivity, entertainment, authenticity, and visibility. It creates an interactive network environment with consumers to promote sales. It is a ‘commodity + service’ mode that goes beyond traditional commodity marketing.

With the development of e-commerce live streaming, researchers are paying more attention to the influencing factors of users’ personal and shopping behaviors. Given that E-commerce live streaming is composed of a series of activities with three components (platforms, hosts, and consumers), the existing research adopts the S-O-R model, technology acceptance model, and information source theory to study consumers’

purchase intention from various perspectives through questionnaires or interviews. Kim and He (2021) studied interaction, economics, entertainment, host characteristics, and the influence of concentration flow on purchase intention based on flow theory. Wen and Lee (2020) studied platform characteristics and information source characteristics (authenticity, attractiveness) on purchase intention. Li et al. (2021) studied the influence of discount, entertainment, and experience on purchase intention through quasi-social interaction theory and added trust and perceived value as mediating variables to study the correlation. Fang et al. (2021) used transaction data obtained from Taobao and J.D. to study the relationship between customer engagement and purchase intention, examining the moderate effect of price. Despite this, few studies have used observational data to examine the direct effects of influencing factors on sales or purchase intentions.

In addition, E-commerce live streamers, as a new type of online influencer, have become the key to successful influencer marketing in the context of E-commerce live streaming. Most researchers focus on the

characteristics of online celebrities and ignore the effect of product type. Wang et al. (2018) explained a difference between utilitarian and hedonic products based on the ELM model. Few studies use the ELM model and study the moderating effect of high/low involvement product type in live streaming. To fill these gaps, we collected the live and transaction data of the TikTok platform. We conducted research based on the ELM model and Information source theory to study the influence of host characteristics on sales and the moderating effect of high/low involvement products.

2. Information Source

An information source is a source of the transmitted information and is known to significantly influence the information recipient's interpretation and utilization of messages. Hovland and his associates (Hovland et al., 1953) presented one of the earliest models in 1953. Following his initial Source Credibility Model, three additional models are cited: the Source Attractiveness Model (McGuire, 1985), the Product Match-Up Hypothesis (Frokan, 1980), and the Meaning

Transfer Model (McCracken, 1989). The Source Credibility Model and Source Attractiveness Model are categorized under the generic name of Source Models. The source credibility model contends that the effectiveness of a message depends on the perceived level of expertise and trustworthiness of an endorser (Hovland, et al. 1953; Ohanian 1991). The source attractiveness model contended that the effectiveness of a message depends on the similarity, familiarity, and likability of an endorser (McGuire, 1985). Yang Huan (2021) uses the survey to study the online celebrity characteristics and finds that expertise, trustworthiness, similarity, and familiarity positively affect purchase intention moderated by trust. Kim and He (2021) find that source awareness, source attractiveness, and source professionalism positively affect purchase intention, and the effect of source awareness is greater than source attractiveness and source professionalism. This paper will study how the characteristics of hosts affect the performance of live streaming from the perspective of information source.

1) Source Credibility

Information sources can have various characteristics, and a representative characteristic that influences consumer attitudes and decision-making is the credibility of information sources. Trust is important in purchase decision-making, and consumers are more likely to believe the information released from authoritative hosts or who has professionalism (Luo et al., 2021). Keran Zhan et al. (2021) use whether a player plays on a professional team to measure professionalism. MCN is an agency of influencers and online creators so that it can represent hosts' expertise. Moreover, reputation score affects trust like e-WOM. Luo et al. (2021) measure the credibility by the grade of an online celebrity which is calculated by accumulating the reputation points. Therefore, the reputation score can measure the source credibility.

H1: Host joining the MCN has a positive effect on sales.

H2: Reputation score has a positive effect on sales.

2) Source Attractiveness

Followers measured the popularity and influence of the online celebrity.

The likability as an effect of the source results from the source's physical appearance and behavior. The presence of many followers means that we believe that might be an approach proxy for a streamer's current capacity and property. According to these, we conduct the following hypotheses.

H3: The number of host's followers has a positive effect on sales.

3. Product Type

The satisfaction, trust, and purchase behavior in an online context depend on the different information that sellers can send out to the market in order to be chosen as a buying place by the consumer. The Elaboration Likelihood Model (ELM) says that attitude changes are formed through the central and peripheral routes. The central route means that the core concept is inferred in-depth, and according to Ou (2014), sufficient information about the product (e.g., product function, price, performance, etc.) affects consumers' attitudes. Through the cognitive process of major information about the product, there is a change in attitude toward

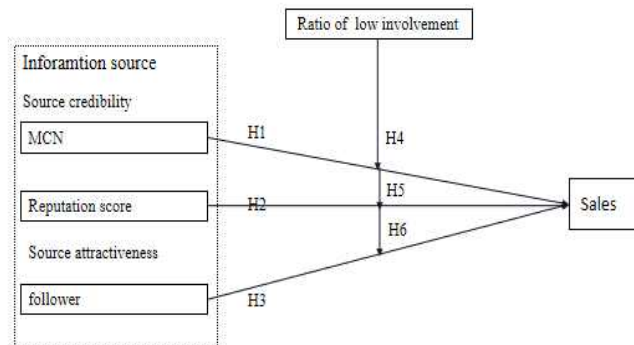
the product, resulting in purchase behavior. The peripheral route values environmental factors and symbolic clues more. The factors unrelated to the product or very little related (attractiveness of the advertising model, popularity, etc.) cause a change in consumers' attitudes in processing the information (Chen et al., 2020). The peripheral route requires less cognitive effort; a person relies on heuristic cues, such as the likability of the endorsers and the source credibility (Gao et al., 2021).

In the shopping scenario of live streaming commerce, viewers obtain both product-centric messages and abundant heuristic cues from the environment. The degree of involvement was studied as a factor influencing the information processing process as a moderator, and it was said that the higher the involvement, the more attitudes are formed through the central route. Involvement is a product-specific phenomenon (Michaelidou and Dibb, 2006). The degree of involvement in a purchase situation will depend on product characteristics (He et al., 2019), such as importance, complexity, price, hedonic and symbolic value, and the magnitude of negative consequences

from failed purchases (Laurent 1985; Zaichkowsky 1985). The criteria for classifying high and low involvement products follow Cheong (2021)'s research.

Te'eni et al. (2007) argued that attractive personalities are more persuasive when the recipient's involvement is low. In other words, persuasive messages with high involvement mainly process information through the central route, while persuasive messages with low

involvement are processed through the peripheral route. Therefore, the type of the product, whether it is a high involvement product or a low involvement product, has a moderating effect on the relationship between host characteristics to sales. Moreover, because live streaming often sells more than one kind of product, we calculate the ratio of low involvement products in live streaming and study the moderate effect.



<Figure 1> 연구 모형

H4: The ratio of low involvement products has a positive impact on the relationship between MCN and sales.

H5: The ratio of low involvement products has a positive impact on the relationship between reputation score and sales.

H6: The ratio of low involvement products has a positive impact on the relationship between followers and sales.

III. Methods

1. Data

TikTok is one of the largest short video and live commerce platforms. Our data on live streaming was gathered from the TikTok and a website that tracks and collects TikTok's live streaming real-time data, Kaogujia.com. We selected the live streaming, whose total sales were ranked in the top 100 for each day as the research object and collected the online celebrity data related to these live streaming. We collected the live streaming data for four months (124 days), from October 10, 2021, to February 10, 2022. The following two types of data are excluded: The first is the live streaming whose duration is greater than 24 hours (1440 minutes). If a live streaming's duration is greater than 24 hours, it is likely to have other influences that we cannot observe. In order to eliminate problems caused by selection bias, we restricted the duration to smaller than 1440 minutes. The second is the missing record. In order to solve the missing record, we manually checked and collected data. The record with missing values that cannot be resolved is excluded. Third, we also use winsorization to solve the outliers. As

a result, a total of 11422 live streaming observations are included in the final sample.

2. Variables

First, we include the MCN, reputation score, follower, and gender as the online celebrity characteristics. MCN is an agency for hosts. If the online celebrity joins MCN, the MCN variable will be coded as 1; otherwise, it is 0. The reputation score is based on the multi-dimensional comprehensive calculation of product evaluation, after-sales service, and complaints, and the data comes from TikTok officials. Gender is a dummy variable. The male is coded as 0; the female is coded as 1. Gender will be controlled in the study.

Next, product types can be divided into low and high involvement products. According to the criteria from Cheong and Cheong (2021), we can categorize the product category into low/high involvement products. And the ratio of low involvement products means the ratio of the number of products with low involvement in the total number of products sold in live streaming.

The data also contains the number

of products, the number of categories, and the average price. The number of products and the number of categories means the total number of products and product categories in the live streaming. The price is the average price of all products sold in live streaming. Fang et al. (2021) found that price played a moderating role in the relationship between customer engagement and purchase intention. Moreover, the number of products influences the e-vendor shop traffic (number of visits), likes, and followers. The more the number and the variety of items on display, the higher the traffic and sales than shops with fewer products. As the literature indicates, it is likely to influence customers' sales and purchase intention (Fang et al., 2020). Thus, the number of products, the number of categories, and the average price will be used as control variables.

Finally, the data includes duration, start time, weekend, event, and sales. Start time is a categorical variable. Between 0-6 are coded as 1, 6-12 are coded as 2, 12-18 are coded as 3, and 18-24 are coded as 4. Whether the live streaming is conducted on weekends will also affect performance, we created a dummy variable to control

the weekend factors: Weekday=0 Weekend=1. For the event variable, we coded the event variable as 1, which was conducted during the event time, and 0 otherwise. There are two main events in the data period. First, the "11.11 Festival" is the largest shopping festival in China, and the event time on the TikTok live streaming platform is 10.27-11.11. Second, the "12.12 Festival" is also a shopping-related festival. The event time is from 12.01 to 12.12. These variables will also be controlled.

IV. Results

To study the factors of host affecting the sales in live streaming, we conduct correlation tests, and the results show that the correlation coefficient between variables is lower than 0.8. And then, to reduce the skewness distribution of the variable, we use log transformation for the number of categories, the number of products, mean price, reputation score, followers, duration, and sales.

We performed hierarchical regression to analyze the hypotheses. The hierarchical regression model supports a researcher's hypothesis, and individual variable inputs may be used

depending on the researcher's purpose. The factors related to the online celebrity were entered separately. According to the change of R² and p-value, we can find that these independent variables affect the live streaming sales.

We also estimated the model using the ordinary least square (OLS) method. We used the robust standard error in the model estimation to address the potential heteroskedasticity issues. Moreover, tested the multicollinearity with VIFs, the highest VIF value was less than ten, and there was no multicollinearity issue. The first column of Table 1 reports the main effects of host characteristics on live streaming sales.

The results show that there is a positive association between MCN and sales. If the online celebrity joins the MCN, which represents expertise, it will have more sales. Thus, Hypothesis 1 is supported. Interestingly, reputation score has a negative effect on sales, and thus we reject Hypothesis 2. The possible explanation for this result is that many studies have proved that reputation or ratings can affect consumers' purchase intention, and sellers will also improve their sales by

improving reputation or ratings. However, there may be fraudulent operations in the improvement process, such as hiring people to give a perfect score to improve their reputation score. Consumers also perceive such operations, so a high reputation score may lead to consumers' antipathy, resulting in adverse effects.

Moreover, the follower has a positive effect on sales, indicating that hosts' attractiveness positively impacts sales. A host has more followers, which means that the online celebrity is more attractive, leading to higher sales, and thus Hypothesis 3 is supported. As a result of the analysis, H1 and H3 are supported, H2 is rejected.

Table 1 presents the results of the moderate effect of product type—the ratio of low involvement product on the relationship between indicators and sales. The results show that the interaction term of MCN and the ratio of low involvement products has a positive coefficient. So, the ratio of low involvement products moderates the relationship between MCN and sales. When there are more low involvement products, the influence of MCN will increase. And for followers, the interaction term is significant and

positive. It means the ratio of low involvement products moderates the relationship. When there are more low involvement products, the effect of followers will increase. The interaction term with reputation score is also positive, which means that if there are

more low involvement products, the effect of reputation score will increase. Overall, if there are more low involvement products, consumers will be more affected by the online celebrity. This follows the ELM model. Thus Hypothesis 4-6 are supported.

<Table 1> Results of Moderate Effects

	OLS	MCN	Follower	Reputation score
Constant	12.178**	12.196**	12.313**	12.461**
time 6-12	-0.056**	-0.056**	-0.057**	-0.056**
time12-18	-0.175**	-0.176**	-0.175**	-0.175**
time18-24	-0.182**	-0.183**	-0.187**	-0.183**
Weekend	0.092**	0.091**	0.092**	0.090**
Event	0.304**	0.304**	0.305**	0.302**
Gender	-0.104**	-0.101**	-0.101**	-0.102**
Duration	0.112**	0.110**	0.118**	0.110**
Number of products	0.100**	0.099**	0.097**	0.100**
Number of categories	0.168**	0.168**	0.169**	0.168**
Mean price	0.034**	0.034**	0.034**	0.036**
Reputation score	-0.018**	-0.018**	-0.017**	-0.030**
Follower	0.125**	0.125**	0.113**	0.125**
MCN	0.066**	0.008	0.067*	0.065**
Ratio	-0.121**	-0.133**	-0.836**	-1.236**
MCN*ratio		0.191**		
Follower* ratio			0.050**	
Reputation score*ratio				0.048**
N	11422	11422	11422	11422
R ²	0.262	0.263	0.264	0.264
Adjust R ²	0.261	0.262	0.263	0.263
F-value	289.86**	271.47**	272.41**	272.58**

V. Conclusion

This study relies on the ELM model and information source, using the TikTok live streaming data from the Kaogujia platform to establish and find the relationship between

host characteristics and sales. We also test the moderating effect of the ratio of low involvement products. The results show that MCN, followers have a significant positive effect on sales. However, the reputation score has a negative

effect on sales. Furthermore, the ratio of low involvement product also has a moderating effect on the follower, reputation score, and MCN. When there are more low involvement products, the effect of information sources on sales will be strengthened. In other words, when the live streaming sells low involvement products, consumers are more likely to be influenced by host.

Our academic contributions can be divided into the following points. We study the characteristics of hosts and products through empirical analysis to supplement the defects of studies related to live streaming. We use the Elaboration Likelihood Model to study live streaming e-commerce, which expands the theoretical use in live streaming research and expands the area of use of the ELM model.

In terms of practical application, we can give some suggestions to the sellers. According to these results, there are some suggestions for the online celebrity in the live streaming. Although the online celebrity characteristics are an essential part of the live streaming, they also should improve the quality of live streaming and product. And

they should pay attention to the product type to know what to emphasize in live streaming. When they sell low involvement products, consumers are more likely to be influenced by host. Thus, for the brand, they need to pay attention and find more suitable hosts. For hosts, they need to pay attention to their own ability and reputation. When the live streaming sells high involvement products, they should pay more attention to how to fully display products and provide more product-related information in live streaming. Hosts also need to consider whether they should be vertical, focusing on several product categories and doing specialization. In the increasingly competitive live streaming industry, find their own advantages is a critical point. The dividends of the entire mobile internet have subsided, and the traffic growth rate is slowing down. Under such circumstances, sellers and hosts should know how to use their resources rationally and how to make further improvements.

For limitation, first, the paper is based on the live streaming level data, lacks detailed product-related data, and fails to segment and

research the product features in detail. We will expand our data and research in future work. Second, there are many live streaming platforms, and there are differences in characteristics and consumers. The model and influence factors in TikTok live streaming may not be perfectly suitable for all platforms. Subsequent studies will conduct comparison studies on purchasing behavior for different platforms.

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