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HOW SOCIAL CUES WORK IN THE CONTEXT OF LIVESTREAMING E-COMMERCE?

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Research in Progress

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Abstract

Livestreaming e-commerce as an emerging social-technological phenomenon has been gaining attention from IS researchers. While past literature has accumulated extensive knowledge on explanatory variables that might lead to the viewers' purchasing behaviours, most of such empirical work focuses on prediction rather than explaining the causal mechanism. In this in-progress study, we draw on the psychology literature and hypothesise informational conformity and social facilitation as two key pathways leading to the purchasing behaviour in the emerging context. This conceptual framework would also be empirically verified using the field data. We propose using a structural equation modelling approach to test the conceptual model. Potential theoretical and practical implications are discussed.

Keywords: livestreaming e-commerce, social presence, informational conformity, social facilitation, structural equation modelling.

1 Introduction

The way of shopping has been evolving in the past few decades along with the development of information technology. We went from the offline market fair towards online e-commerce, and are moving from online e-commerce to real-time interactive livestreaming e-commerce (LSE). LSE is an emerging type of e-commerce that combines the immediacy and interactivity of livestreaming with the convenience of online shopping. In this form of e-commerce, retailers host live broadcasts in which they showcase their products to customers in real time. Customers can watch the broadcasts, ask questions, and make purchases directly from the livestream. One of the key features of livestreaming e-commerce comparing to other forms of e-commerce is its newly-added visual and auditory elements. Retailers use high-quality cameras and microphones to provide viewers with a clear view of the products and engaging commentary on their features and benefits. Additionally, livestreaming e-commerce often includes interactive elements such as live chat and audience participation, which could enhance the overall shopping experience for customers. As the popularity of livestreaming e-commerce continues to grow, it is becoming an increasingly important part of the overall e-commerce landscape.

However, there is a lack of field work in understanding the underlying mechanism leading to the consumer's purchasing behaviours in the emerging context of LSE, which is the research gap this study is intended to fill. However, in a broader context, there have been some well-published / in-progress empirical studies on the explanatory variables with that could be used to predict the success of a livestreaming session (though the explanation part is still missing), for example, influencers' expressed facial/verbal emotion (Bharadwaj et al. 2022, Lin et al. 2021, Meng et al. 2021, Yu et al. 2022), information cues (Tan et al. 2019), the relationship between streamer and consumer (Hou et al. 2020, Hu and Chaudhry 2020, Wongkitrungrueng et al. 2020), features from the textual interactions (Wang et al. 2021), information richness (Wang and Wu 2019), etc.. However, these studies with rich empirical

evidence has not touched on the underlying mechanism, paritally due to the limitation of secondary data. If we enlarge our range of survey to the traditional e-commerce, Kuan et al. (2014) have done an interesting work using a neuroIS approach to gain understanding about the informational and normative social influence on consumers' group-buying behaviour.

Apart from the work on the empirical side of the phenomenon, there have been some theoretical frameworks proposed to explain the purchasing behaviour. For example, the adoption of the Stimulus-Organism-Response (S-O-R) model has been agreed upon by many researchers (Fei et al. 2021, Lee and Chen 2021). Notably, there has also been one proposed conceptual study proposing social presence as an important factor driving the purchasing behaviour (Xie et al. 2019). However, to the author's best knowledge, probably due to the difficulty of obtaining the appropriate empirical evidence, theoretically-driven attempts have been methodologically limited to surveying and lab experiments. Large-scale real-world empirical evidence is still lacking to support such models.

Given the aforementioned research gap, this study aims to answer *to what extent and through what mechanisms would the visual and auditory social cues affect viewers' purchasing behaviours*. The rest of the paper will be organised as follows. In Section 2, we will draw on theories mostly from the field of psychology to establish a conceptual model accounting for the purchasing behaviour of the viewers under the context of LSE. In Section 3, we will introduce the proposed methodological approach to provide empirical evidence and raise some potential issues that might affect the implementation of this approach. In Section 4, we will conclude the study and identify the potential theoretical and practical implications of the study.

2 Hypotheses Development

In this section, we draw on the rich literature from the reference discipline of psychology to articulate our theoretical framework and explain the underlying mechanism of purchasing behaviours under the context of the LSE. Particularly, drawing on informational conformity and social facilitation as two key pathways leading to the purchasing behaviour, we also identified additional factors presented in the context of LSE that we hypothesise to moderate the main effects of two paths.

2.1 Direct Effect of the Socials Cues about the Presence of Others on Viewers' Purchasing Behaviour

Informational conformity is the focal path here that connects our key IT artifact – presented social cues about the presence of others – with our dependent variable – viewers' purchasing behaviour. As this social cue -> perceived social presence -> conforming behaviour path has been supported by an extensive list of literature in the field of psychology,

Recent evidence has clearly suggested that contextual properties lead to an increasing level of perceived social presence. A highly-cited review article by Oh et al. (2018) suggested that, among others, social cues about the presence of others could be one of these contextual properties which boost the experience of social presence. For example, in the stream of social presence theory, there has been a majority of evidence showing that introducing additional virtual communicators would increase feelings of social presence (e.g. Choi and Kwak 2017).

In the meanwhile, conformity has also been one of the earliest studied mechanisms in the field of psychology. In 1955, Deutsch and Gerrard provided two explanations of people's conforming behaviours, namely normative conformity, and informational conformity (Deutsch and Gerard 1955). While normative conformity usually refers to a person yielding to group pressure because a person wants to fit in with the group, informational conformity usually suggests that someone lacking knowledge and experience will tend to look to the group for guidance. Based on the identified explanations, as well as the support from recent literature (Ding & Li, 2019), we argue that normative conformity should not be a major explanatory power for viewers' purchasing behaviour. Because under the context of LSE, viewers have no cost and total freedom of quitting the livestreaming session at any time. If the pressure

from the presence of others has made the viewer uncomfortable, it could be predicted that the viewer would have left the livestreaming session instead of being put under pressure and conform to purchasing. We hence argue that the mechanism of informational conformity is the main driving force of the viewers' purchasing behaviours. We also note that drawing on this theoretical lens, there has been extensive past evidence on various contexts clearly suggesting that a higher level of social presence will increase online social conformity (e.g. Wijenayake et al. 2020, Kyrlitsias et al. 2020, Liu et al. 2022).

Drawing on the linkage shown above, we would directly hypothesise for a straightforward direct effect of the social cues about the presence of others on viewers' purchasing behaviour.

H1: Social cues about the presence of others have a positive effect on motivating the purchasing behaviour of LSE viewers.

2.2 Moderating Effect of Negative Product Comments on Informational Conformity

Referring to the previous discussions on the path of informational conformity, we argue that the existence of negative comments on easily visible places, as "guidance sought from the group", will significantly negatively reduce the possibility of purchasing behaviour by the viewer. However, it is worth noting that we do not hypothesise about positive comments because the behaviour of checking the product comments already implies a significant level of interest in the product. Hence, providing additional positive comments is hypothesised to not have a significant impact on the viewer's purchasing behaviour.

H2: The existence of negative product comments on easily visible places will negatively moderate the effects described in H1.

2.3 Social Facilitation and Mediating Role of Viewers' Emotional Arousal

Apart from the informational conformity path which extensives knowledge has been built on, we also notice from the literature that there might exist an alternative route explaining the effects of social cues, which is the activation theory explaining social facilitation, proposed by Zajonc in 1965. It argues that the enhanced level of emotional arousal, caused by the social cues (and thus the perceived social presence), plays a crucial role in the process of social facilitation. It also noted that the increase (otherwise it is a process of social inhabitation) of performance in carrying out tasks is dependent on the boundary condition that the task should be familiar to the person or is an easy-to-learn skill. In the discipline of information systems, Rafaeli and Noy (2002) studied social facilitation in the context of online auction and affirmed that social facilitation indeed occur through our previously argued route, under the condition that such presence is virtual. Considering in the particular context of LSE, the viewing of such streaming perfectly match the description about the boundary condition. The UI/UX of such LSE applications are typically made easy-to-learn for a general user. We thus hypothesise the following by instatiating from activation theory:

H3a: Perceived social presence increases the level of emotional arousal of the viewer.
H3b: Increased level of emotional arousal leads to more purchasing behaviours among the viewers .

2.4 Moderating Effect of Online Shopping Experience on Informational Conformity and the Emotion Arousal of Viewer

The two focal explanatory paths rely on one important factor - the viewer's experience. On the one hand, informational conformity is conditioned on the assumption that the viewer should be unfamiliar / not knowledgeable about the current situation.

On the other hand, studies on the phenomenon of social facilitation also suggest that increase in performance is conditioned on that the task is familiar to the viewer or that the task is easy to learn

(Zajone, 1965). There is one other argument that might strengthen the negative moderating effect of viewer experience on emotional arousal. There have been rich evidence in psychology suggesting that the level of motion arousal due to experienced events will be lower (e.g. Livingstone et al. 2012). This leads to us hypothesising that the negative moderating effect would be strengthened in addition to the effect predicted by the condition of activation theory.

We thus provide the following two hypotheses:

H4a: Online shopping experience of the viewers will negatively moderate the effects described in H1.

H4b: Online shopping experience of the viewers will negatively moderate the effects described in H3a.

Our overall conceptual model is illustrated in Figure 1 below.

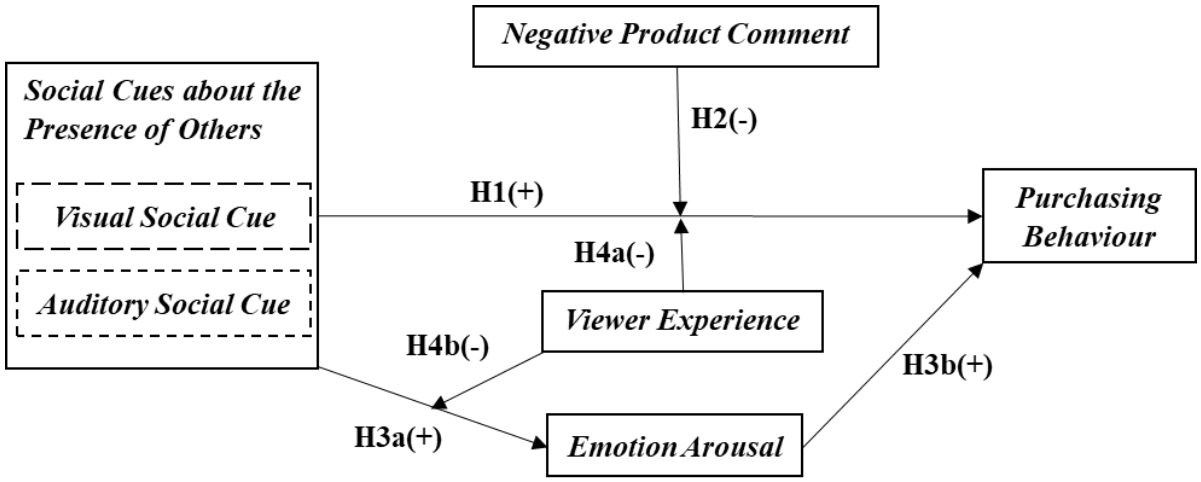

Figure 1. Conceptual Model

3 Proposed Methodology

The research model will be tested using a PLS structural equation modelling approach (PLS-SEM). As indicated by Urbach and Ahlemann (2010) and thereby Chin (1998), this study is more suitable for using PLS-based SEM instead of covariance-based SEM mainly for the reason that it is more suitable for a formative model (note that social cues about the presence of others will be formed by visual/auditory social cues).

3.1 Data Collection

Large-scale data collection will be needed to form a sufficient product-level dataset for examining the hypotheses. Collaborating with one of the largest LSE platforms in China (where LSE has evolved as a multi-billion dollar industry), we plan to obtain the product-clip-level data from the following raw sources: the video of the product clip, all textual interactions during a product clip, and the related streamer/product/viewer characteristics after proper anonymisation process.

3.2 Measurement - Constructs

The constructs illustrated in the conceptual model will be operationalised as follows.

In the context of livestreaming e-commerce (LSE), social cues about the presence of others can be regarded as a formative construct that is shaped by both auditory and visual social cues. The real-time

nature of LSE platforms allows for the integration of these two types of social cues, creating a highly immersive environment for the viewers.

There are multiple unique features in the LSE platform that could serve as a visual social cue to imply the presence of others. We plan to utilise these features as indicators to obtain an error-free measurement of the visual social cue. These features include the number of current viewers in the livestreaming session, presence of masked user id with a count of viewers who are 'currently leaving for the shopping cart', presence of masked user ids who just followed the streaming session, and count of likes & shares.

The auditory social cue about the presence of others will be operationalised by a audio-based keyword detection algorithm. The plan will be to identify some keywords from the audio recording that are used to mention the 'other' audiences (i.e. implying the meaning of others' social presence). And the frequency of such mentioning during the presentation of a product will be taken as the measurement of auditory social cues about the presence of others.

To operationalize the variable of 'existence of negative product comments on easily visible places,' we will use a pre-trained deep neural network to determine the expressed emotion of the top five default-ranked comments displayed on the product detail page, ensuring that none of the comments express negative feelings and have ratings of less than five stars, and denote the dummy variable as 0 if the test is passed. We will also test different numbers of comments for robustness.

The viewer experience will be measured using the total hours spent watching livestreaming sessions on this platform by the date that this viewer participated in our focal livestreaming session. This proxy would be appropriate as it captures the feature clearly and operationalizable for being directly available from the platform.

Xu et al. (2020) studied emotional arousal measurement in the context of LSE, where they found a strong correlation between measured emotional arousal and positive emotions such as "enthusiastic", "exhilarated", "energised", and "excited". This emotional arousal encourages viewer participation and action during livestreaming sessions. To measure emotional arousal, we propose using the emotion of the textual interactive area and the intensity of textual interactions (Wang et al. 2021). Specifically, we suggest measuring the percentage of interactions classified as "happy" using a pre-trained deep neural network. However, as informed by literature, cultural differences may impact emotional expressions (Tsai, 2007), and we will address this concern in our future analysis.

Lastly, we plan to operationalise the purchasing behaviour by a binary variable that distinguishes if one particular viewer has made any purchase in one particular livestreaming session. This operationalization would also be available directly from the provided dataset.

3.3 Measurement - Control Variables

In addition to the previously noticed control variables (e.g. streamer demographics (e.g. gender, total updates, total followers), video attributes (e.g., views, the total number of comments, duration, average product price, total discounts)) and product characteristics (e.g. transaction price, product age, brand level, product reviews, product favourites, seller type, seller level) in a study of LSE context (Song et al. 2021, Wang et al. 2021, Yu et al. 2022), we would also like to control the facial and auditory emotion expressed during the product clip to avoid alternative explanation for the emotion arousal as there has been some recent empirical evidence suggesting the potential correlation between the expressed emotion of the streamer, the emotion of audience and the sales performance of a livestreaming session. (Bharadwaj et al. 2022, Lin et al. 2021). In addition to that, we would also like to include a new binary feature in the streamer characteristics to distinguish the potential differences between the streamer-based livestreaming session and the shop-based livestreaming sessions in terms of consumer motivation, streamer/seller motivation, etc.

4 Conclusion and Intended Contributions

In this study, we have proposed an empirically verifiable conceptual model that originates from the psychology literature. Two pathways are hypothesised to account for the viewers' purchasing behaviour in the emerging context of LSE, namely informational conformity and social facilitation. A detailed roadmap for testing the conceptual model is also proposed to enable follow-up empirical work.

As an early-stage work, this study undoubtly has its limitations. Notably, one limitation of this study is that data would only be collected from one live-streaming e-commerce (LSE) platform in China, which may limit the generalizability of the study's future findings to a broader audience. Further research/verification work may contribute by using a more diverse sample of LSE platforms.

The study plans to contribute to the literature in the following ways. First, to the authors' best knowledge, this study firstly raises social facilitation as an alternative, partially mediated route that could be of explanatory power to the viewers'purchasing behaviour in LSE sessions. Second, the study contributes to the conformity literature by empirically verifying it under the new context of LSE and additionally obtaining the effect of two unique and new moderating factors on the process of informational conformity in this unique context. Lastly, if the model is to be verified, we will be theoretically establishing and empirically verifying a mechanism that could be used to both explain and predict the purchasing behaviour of the viewers which is a significant advancement in the LSE literature.

The study also has practical implications, particularly for LSE platforms. For platforms, with a better understanding of the connection between social cues and the perceived social presence, they could empirically understand how the change in several simple UI/UX designs could contribute to the sales volume.

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