



How Live Streaming Changes Shopping Decisions in E-commerce: A Study of Live Streaming Commerce

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Abstract. Live Streaming Commerce (LSC) is proliferating in China and gaining traction worldwide. LSC is an e-commerce service where sellers communicate with consumers through live streaming while consumers can place orders within the same system. Despite the significant involvement of consumers in LSC, it has not been systematically analyzed how consumers make shopping decisions when engaging with LSC. In this paper, we conduct a mixed-methods study, consisting of surveys ($N_1 = 240$) and follow-up interviews ($N_2 = 16$) with LSC consumers. We focus on two features of LSC, i.e., the communication between merchants and consumers through live streaming and the participation of streamers, and aim to understand how these changes influence consumers' decision-making process in LSC. We find that LSC enables merchants to exchange information with consumers based on their needs and provide additional customer services. Because of the appropriate information about the products they acquire and the enjoyable shopping atmosphere, consumers are willing to purchase products in LSC. As the intermediaries between merchants and consumers, streamers utilize their independent identity from merchants to enhance consumers' awareness of shopping and persuade their online shopping decisions. Moreover, we consider the opportunities and challenges of current LSC services and provide implications for LSC services and the research community regarding the development of LSC.

Keywords: E-commerce, Live streaming, Consumer decision-making process, Decision support systems

1 Introduction

“All girls, get ready, buy it!” At midnight of February 24, 2020, when Li Jiaqi just stopped speaking, 20 million consumers, who were watching his live stream, snapped up 80,000 eye shadows within one second¹. The success indicates that live streaming marrying e-commerce (together: Live Streaming Commerce, LSC) may be the future of e-commerce. A statistic from China Internet Network Information Center shows that, by January 2021, 32.9% of Chinese Internet users, 309 million people, had participated in LSC (CINIC, 2020). LSC has also been gaining worldwide traction. Walmart, for example, has expressed interest in utilizing TikTok’s LSC services in the United States (Zhong, 2020).

As shown in Figure 1, LSC provides a novel online shopping experience to consumers than traditional e-commerce services and enables a novel communication channel between sellers and consumers. Consumers receive real-time information and watch live streaming performances of streamers during the entire consumer decision-making process (Erasmus et al., 2001). Given that human–computer interaction (HCI) and computer supported cooperative work (CSCW) researchers (Moser et al., 2017, 2019) have explored the severe impact of the system design and e-commerce model on consumers’ decisions in traditional online shopping, we aim to explore factors that determine the shopping decision of consumers in LSC. By studying the decision-making process in LSC, we can better identify the challenges and opportunities in current LSC systems, which may inspire the future design of systems to support consumers’ online shopping experiences. In particular, we examine the factors of LSC which influence the decision-making process from two perspectives: first, the technology perspective, i.e., how does live streaming technology influence the purchase decision making in LSC. And second, the human perspective, i.e., how do live streaming interactions between sellers and buyers influence the purchase decision making in LSC.

Compared to traditional e-commerce services, where consumers complete the online shopping process on the website, LSC enables merchants and consumers to exchange information in real-time and affords one-to-many communication (Hamilton et al., 2014). Furthermore, entertaining live streaming elements have also been introduced into LSC (Li et al., 2019; Lu et al., 2018), which afford user engagement, and further influence the decision-making process of users in LSC. In other words, LSC serves as a decision support system in the consumer decision-making process. To better understand how live streaming influences consumer making decisions in LSC, we aim to address the following research question:

¹ The video record of the live stream: <https://www.bilibili.com/video/av91490264/>



Figure 1. The interface of Taobao Live. **a)** When users browse products on e-commerce platforms, they can notice whether the product is on sale in LSC and can directly enter the live streams by clicking the icon. **b)** Users can view all products on sale in LSC when they watch the live streams. They can send messages to streamers. **c)** Users can enter the website of the products without leaving the live streams. **d)** Users can place the order while the live stream thumbnail is placed at the left bottom corner of the website. **e)** The live stream image keeps in the interface during the entire process of online shopping

RQ1 How do users perceive the affordances and the challenges of live streaming in the decision-making process in LSC?

On top of providing communication channels between merchants and consumers during online shopping process, LSC also introduces market intermediaries (Chen et al., 2020), i.e., streamers, into LSC. LSC streamers can collaborate with different merchants and sell products provided by them. Therefore, LSC streamers serve as a third party between consumers and merchants in LSC. By introducing third party participants to online shopping, it is not clear how market intermediaries influence the behavior of consumers in LSC. Therefore, we ask the following research question:

RQ2 How do users perceive the affordances and the challenges of streamers in the decision-making process in LSC?

We conduct a mixed-methods study, which consists of an online survey ($N = 240$) and interviews ($N = 16$) with LSC consumers to investigate the affordances and challenges consumers perceive in the decision-making process in LSC. We find that the perceived usability and usefulness of the products consumers were interested in, was positively influenced by the information provided via live streaming. Streamers also provide additional customer services to create an enjoyable shopping environment during the period of online shopping and enhance consumers' recognition of the online stores. Moreover, streamers utilize live streaming entertaining features to enhance consumers' pleasure and arousal, and thus incentivize consumer shopping intentions in the decision-making process. However, since all consumers in LSC share the same communication channel with streamers, some experienced consumers perceive the information in LSC as repetitive, and the shopping efficiency decreases as they become familiar with LSC. Because of the perceived independence between LSC streamers and merchants and the recognition of streamers in other live streaming practices, consumers have been influenced by streamers in their decision-making process, especially in the stages of shopping need awareness, purchase decision and post-purchasing evaluations. On the other hand, streamers control the source of information consumers get in LSC, and their dominance has been perceived as a challenge by consumers in LSC practices.

This paper makes three contributions by understanding the emerging socio-technological phenomenon. First, we study the consumer decision making process in LSC, and consider the influence of live streaming and the market intermediary participant. Second, we analyze the affordance of live streaming in e-commerce practices and explore how live streaming elements can influence non-live streaming practices. Finally, we provide design implications on how to break through the limitations of the current LSC.

2 Background and Related Work

The story of LSC starts from shopping guide websites. When making an online shopping decision, consumers would like to take opinions from others as a reference, which is called electronic word-of-mouth (eWOM) (Dellarocas, 2003; Hennig-Thurau et al., 2004). Sevitt and Samuel (2013) showed that more than 72% of shoppers paid attention to recommendations when browsing Pinterest. In China, consumers are also interested in other people's comments on products and several community-based online review websites, e.g., MOGU, have been developed for more than ten years (Peng et al., 2016). Shopping guide websites enable users to share their online shopping experiences, comments on products and recommend products with a link to the online shopping website. They will be paid commission if other consumers purchase products from the link.

Another similar phenomenon as LSC is TV shopping (Darian, 1987), which has substantially grown since the 1980s (Stephens et al., 1996). Hosts present a live show to demonstrate and introduce products, and respond to consumers questions from telephone inquiries (Stephens et al., 1996). Programs on TV shopping focus on promoting and selling products to obtain profits, which suggests that TV shopping channels are business channels but not entertaining television programs (Engel et al., 2000). Shopping convenience (Lim and Kim, 2011), satisfaction of entertainment requirements (Cortese and Rubin, 2010), reduction of loneliness (Kang and Ridgway, 1996), and the "parasocial interaction" between consumers and hosts (Park and Lennon, 2004; Alperstein, 1991) have been considered as the main motivations of consumers to participate in TV shopping. In China, the market size of the TV shopping peaked in 2015, with 39.9 billion CNY (MOFCOM, 2018). The poor communication between consumers and merchants, the lower price advantage of products, the high production costs of TV shopping programs, and the development of online shopping, have impeded the development of TV shopping channels in China (Li 2020; Liu, 2021).

With the development of 4G and the declining cost of mobile traffic in China, there was a spurt in live streaming, enabling more efficient real-time communication between individuals. Live streaming has become one of the most popular entertaining internet applications in China. By June 2020, live streaming attracts 562 million users, accounting for 59.8% of all Chinese internet users (CINIC, 2020). Therefore, shopping guide websites introduce the live streaming service, which enables users to present products beyond texts and images. Because shopping guide websites strongly influence people's shopping decision (Peng et al., 2016) and earn more than 6,000 million RMB of commissions from e-commerce platforms per year, e-commerce platforms terminated cooperation with shopping guide websites. Afterward, e-commerce platforms, such as Taobao, developed their own LSC services and shopping guide websites began to transform into e-commerce platforms. Meanwhile, video/streaming platforms also encourage the streamers to conduct e-commerce practices and build internal

online shopping systems (Day, 2022). Nowadays, e-commerce live streaming has become the most popular type of live streaming and attracts 32.9% of all Chinese internet users.

In the following, we review the most related work in three aspects: decision-making in online shopping scenarios, market intermediaries in e-commerce, and live streaming affordances.

2.1 Consumer Decision Making in Online Shopping

A purchase decision is a behavior of consumers to determine and follow a decision-making process to reach a choice of purchase (Erasmus et al., 2001; Howard and Sheth, 2001). Holtzman (1988) describes the process of decision-making in three stages: formulation, evaluation and appraisal. In the context of online shopping, several models (Hawkins et al., 2009; Howard and Sheth, 2001; Nicosia and Mayer 1976) capture the consumer buying behavior, and classify user behavior in five fundamental stages: shopping need awareness, information search, alternative evaluations, deciding to purchase, and post-purchasing evaluation.

When making the online shopping decisions, consumers have to consider two perspectives: what to buy and where to buy (Koo et al., 2008). In other words, consumers will evaluate both, products and online stores during the decision-making process (Jarvenpaa et al., 2000), including perceived usefulness and perceived ease-of-use of products and their trusts of the online store (Van der Heijden et al., 2003). Communication between sellers and consumers is crucial for such evaluations (Thomas, 2005). More than 50% of consumers expect advice from sellers about products they are interested in (Keeling et al., 2010) or personalized recommendations on their purchase (Agnihotri et al., 2009). Moreover, the diversity of information (Lowry et al., 2015) and real-time communications (Keeling et al., 2010) are preferred by consumers in their shopping decision making processes. On the other hand, consumers' emotions, such as pleasure, arousal, and dominance (Mehrabian and Russell 1974), also have significant impacts on their shopping behaviors (Gorn et al., 2001; Szymkowiak et al., 2021; Coker, 2020), and further determine their online shopping decisions (Hagtvedt and Patrick 2008; Herabadi et al., 2009).

To help consumers to conduct online shopping decisions, decision support systems have been introduced to e-commerce systems (Kasper, 1996), including interactive decision aids (Häubl and Trifts, 2000) and decision support technologies (Wang and Benbasat, 2008). Previous studies focus on decision support systems interacting with consumers, such as recommendation agents that assist consumers to screen products (Lin et al., 2010), comparison matrix that help consumers to organize product information (Alba et al., 1997) and virtual reality and augmented reality that provide immersive shopping environments (Peukert et al., 2019).

LSC introduces a novel decision support system into e-commerce, which supports real-time communication between sellers and consumers, i.e., live streaming (Cai et al., 2018; Cai and Wohn, 2019). Cai et al. (2018) conducted a survey study among English-speaking participants to investigate the motivations of consumers to watch live streams, such as Amazon style live code, Facebook Live, and YouTube Live, when they search information of products. They summarized that product demonstrations and product information are the main utilitarian motivations, while the interaction between consumers and streamers is the main hedonic motivation to watch a live stream of e-commerce. Later on, they elaborated their survey results with a gratification framework and identified four motivations, i.e., enjoyment of interaction, substitutability of personal examination, need for community and trend setting (Cai and Wohn, 2019). However, it is not clear how live streaming influences consumers' shopping decisions in LSC, from both positive and negative perspectives, for instance, the efficiency of information delivery (Lowry et al., 2015), the stimulation of impulse buying (Moser et al., 2019), and personalized recommendations (Agnihotri et al., 2009). To fill this research gap, we aim to understand how live streaming in LSC can influence the evaluations of products and online stores in this paper.

2.2 Intermediaries in E-commerce

Market intermediaries are usually referred to the agents who establish and maintain market relationships between merchants and consumers (Chen et al., 2020). On the one hand, market intermediaries help merchants to find proper pools of buyers (Pazgal and Soberman, 2008). On the other hand, market intermediaries can help consumers in searching, evaluating, and comparing products (Chen et al., 2002). E-commerce platforms are considered as the most common market intermediaries in e-commerce (Chakravarty et al., 2014).

Recently, more and more market intermediaries have been introduced in online shopping practices. Previous studies have examined two types of market intermediaries in e-commerce: internet influencers (Geng et al., 2020) and average people (Chen et al., 2020; Cao et al., 2020, 2021). Internet influencers can earn fortunes with their fame by acting as market intermediaries between merchants and their fans (Ku et al., 2019). The existing credibility between them and their fans can positively influence the shopping decisions made by the targeted consumers. Moreover, the sense of fan community reinforces consumers' purchase intention (Geng et al., 2020). Cao et al. (2021,2020) and Chen et al., (2020) have studied market intermediaries who are average people. These intermediaries recommend and sell products to their friends, relatives and other people in their social network through social media. They serve as either local trend detectors or socially-connected convenience stores to satisfy consumers who have close relationships with

them (Chen et al., 2020). The peer-to-peer trust in existing social networks and the trust of the community encourage consumers to make shopping decisions with these intermediaries (Cao et al., 2021).

Compared to market intermediaries studied in previous work, LSC streamers interact with their consumers directly through live streaming and they actively participate in every stage of the decision-making process of consumers in LSC. Therefore, in this paper, we aim to understand how streamers behave as market intermediaries to influence consumer decision-making in LSC.

2.3 Live Streaming and Its Affordances

Live streaming enables people to share images and voices in real-time (Haimson and Tang, 2017). This technology brings increased interactivity between people who are not in the same location for many activities in daily life, including entertainment, education, and social activities (Lu et al., 2018). Live streaming has been widely studied in the field of HCI and CSCW, of which contents including video games (Cheung and Huang, 2011; Li et al., 2018), online performance (Taber et al., 2019), online education (Hew and Hara, 2007; Ma and Yuen, 2011), and social activities (Dougherty, 2011).

Affordances have been defined broadly in the field of HCI and CSCW. We root our work in Gibson (1977) and Hutchby (2001)'s definitions, defined as the qualities, features, or cues within a technology that affords uses to individuals (Aakhus, 2007; Nagy and Neff, 2015; Postigo, 2016). Previous work have examined multiple affordances of live streaming, including real-time communication (Sjöblom and Hamari, 2017), multi-dimensional information exchange (Taber et al., 2019), hot and cool media (McLuhan, 1994), and one-to-many communication (Hamilton et al., 2014). These affordances have constructed relaxing environments (Sjöblom and Hamari, 2017), connected audiences with like-minded people (Taber et al., 2019) and formed communities to extend the social relationships between participants (Lottridge et al., 2017). Moreover, since the majority of live streaming is entertaining, some features have been involved in live streaming systems as the affordances of entertainments (Lu et al., 2018), e.g., Danmuku (Ma and Cao, 2017), virtual gifts (Lu et al., 2018), platform-wide competitions (Cunningham et al., 2019), and "Lianmai", which allows two streamers to have a video chat during their live streams (Li et al., 2019).

However, previous studies have not investigated the live streaming affordances of online shopping activities. As e-commerce live streaming has become the most popular live streaming in many countries (CINIC, 2020), our work aims to identify the challenges and opportunities of the current LSC systems and inspires better design of live streaming affordances of online shopping activities.

3 Methods

The research questions that we study in this paper are about how consumers are influenced by live streaming and streamers in their decision-making process. We conduct a mixed-methods research methodology to explore consumers' experiences and understandings in LSC. The study has been approved by the Institutional Review Board (IRB) at the City University of Hong Kong where the study was conducted.

3.1 Data Collection: Online Survey

The first step of our study is a survey study with LSC consumers. We developed an online survey with both multiple-choice questions and open-ended questions to explore consumers' shopping experiences in LSC. The survey was organized in English and then translated into Mandarin by two native Mandarin speakers in the research team. We recruited participants who have experience in LSC in China. We used services from wj.qq.com, i.e., a firm specializing in recruiting study participants. The survey was active for 3 weeks in June of 2020, and a total of 240 responses were collected. The expected time for completing the survey was 10-15 minutes. Each participant received 15 CNY as reward. At the end of the survey, we asked respondents whether they would like to attend post-survey interviews. If so, they left their contact information.

3.2 Data Analysis: Online Survey

After collecting survey data, we created a statistic with the basic information of participants, including age, location, times of watching per week, money spent per month and months of experience for watching, and their usage of different platforms. 240 participants completed our online survey in total and the average finishing time was 10 minutes 14 seconds. Most of the participants were young or middle-aged people, in the age group of 18-40 (94.6%) with a concentration in 26-30 (38.3%). Those results are consistent with the statistics of LSC users and previous research (Lu et al., 2018) on live streaming in China. 86.3% of the participants have participated in LSC at least once per week and 79.6% of them spend more than 100 CNY on buying products from LSC per month, demonstrating their rich experiences in LSC. More than half (54.2%) of the participants have used LSC for half to one year, which demonstrates the rapid development of LSC since 2019.

The development of LSC is not limited to a single platform. More than half of our respondents have used several different LSC services on Taobao (88.33%), JD (56.83%), TikTok (67.5%) and KuaiShou (51.67%). These four platforms fall into two completely different categories: e-commerce platforms and video/streaming platforms. Previous studies indicated that Chinese live streaming practices are only conducted through video/streaming platforms (Lu et al., 2018,

2019). However, our result suggests that LSC has also been developed on e-commerce platforms.

Respondents also addressed their preferences on LSC and their perception of different streamers and platforms in open-ended questions. We used an open coding method (Corbin and Strauss, 2014) to analyze these responses. We classified factors that influenced their online shopping decisions at different stages. Native Mandarin-speaking authors coded all responses individually and met several times to discuss the agreement on the final results. All codes were translated into English and discussed by the research team.

3.3 Post-Survey Interviews

To get a deeper understanding of our research questions, we conducted post-survey interviews using WeChat voice calls. From 213 survey participants who would have liked to join the interview study and had left their contact information, we randomly sampled 20 users. Sixteen of them replied to our interview invitations between June and July 2020. Interviews were conducted in Mandarin, audio-taped, and transcribed by three native Mandarin speakers in the research team. Each interview took 30-45 minutes, and each participant received a 100 CNY honorarium for their time. Based on the online survey data analysis, the interview questions aimed to explore more insightful understandings of the affordances and challenges of live streaming and streamers in their LSC experiences. We asked them to describe their LSC shopping experience in detail, including the information they received in LSC, their perceptions about this information, and their understanding of the products, merchants, and streamers when they made the shopping decision.

We followed the code scheme as in the data analysis of survey data. Native Mandarin-speaking authors coded all responses individually. When there were new themes observed by researchers, the research team came together to discuss the agreement on the final results. Finally, we summarized findings of each research question, as influential factors in shopping decision-making.

4 Affordances and Challenges of Live Streaming

Live streaming technology provides synchronized multisensorial communication between merchants and consumers. Consumers can see the action of merchants and hear the merchants' voices, while merchants can read text messages sent by consumers in real-time. We find that live streaming enables merchants to enhance consumers' perceptions of products and online stores at the stages of information search and deciding to purchase. Meanwhile, live streaming affords consumers' pleasure and arousal, which actively incentivizes impulse buying in LSC. On the other hand, since the communication in LSC is one-to-many, the information

received by shoppers has not been personalized, thus introducing challenges in shopping efficiency.

4.1 Afford Evaluations on Products

Around one third (36.3%) of the respondents considered that the products sold on LSC have good qualities and 41.7% of the respondents agreed that they bought products in LSC because they think that these products are useful to them. To better understand why people consider the products they bought in LSC are useful and have better qualities, we explore how they generate such perceptions during their shopping experiences.

Accessibility of Authentic Information First, the accessibility for acquiring authentic information has been supported in LSC. Merchants can provide an authentic demonstration of the products in live streams (Wongkitrungrueng and Assarut, 2018). Live streaming transmits their expressions and actions in real-time, in a way that cannot be pre-processed or edited prior to being presented, and consumers can access the actual appearance and applications in real usage scenarios, such as clothes, cosmetics, etc. (Tang et al., 2016). Therefore, live streaming enables consumers to get more authenticate information from merchants: “Now, if I want to buy clothes, I will definitely look for a LSC store so that I can ask the merchants to put the cloth on for me. You know, the description of clothes on Taobao only contains some pictures with professional models, which is so fake, and I cannot make decisions based on that. I want to see the actual fit, like I am trying the cloth in the fitting room.” (P13) On top of using the products in live streaming to deliver authenticity to consumers, merchants can also show the producing environments to consumers in LSC. These presentations provide viewers with a better understanding of products: “I knew that we have such a beautiful village in Yunnan through LSC. The sky, the water, the mountain are so beautiful from their lens. I want to buy products from them because I know how good the environment is, and it definitely satisfies my demand for organic food.” (P9)

Targetability of Information Collection It is not always the case that the more information the consumers gets, the better. The second affordance that we explore in LSC is whether consumers can receive the information precisely. Although the information of products listed on the traditional e-commerce platforms can cover the majority of problems that consumers might have, each consumer may have different needs for information. In LSC, merchants can immediately know consumers’ needs for the products and adjust their presentations based on audience real-time feedback. Consumers do not need to find the information they need from a large number of texts and images on the website but can get an accurate response from merchants directly: “Last time I

bought a special cleaning tool. It was my first time to know this tool, so I was worried about whether its size is too large and where to place it. The merchant answered all my questions patiently and showed me how to use it. It is very nice because I know this is something that I can use based on her explanation.” (P10) In the shopping experience of P10, she cares more about the size and installment of the cleaning tool than other information. Through visual demonstration and real-time communication, merchants can efficiently solve her concerns, which increases the efficiency for P10 to make shopping decisions.

With such authentic and efficient information exchange in LSC, more and more consumers consider LSC as their first choice of online shopping: “It should be said that I have developed a habit now, that is, when I want to buy something, I will first go to Taobao Live. If I have not found a LSC, I will then search for it on other e-commerce platforms.” (P8) P2 considers he saves money by using LSC because he is more satisfied with products he bought in LSC than other e-commerce platforms: “Sometimes, I do not know how to use the product if I buy it from Taobao. It is a waste of money. Now I feel much better (from LSC) because streamers will show me how to install it, use it and the precautions, etc.” (P2)

Reliability of Peer Review Lu et al. (2018) and Cai et al. (2018) both mentioned that one advantage of LSC is that it enables consumers to obtain reliable information on products from other consumers in the same LSC because they trust peers more than merchants. Although this argument sounds reasonable, this was not considered as an advantage of LSC for most respondents. Only 17.5% of the participants trust other consumers’ comments on products. In contrast, participants do not think reviews from other consumers are trustworthy, especially for positive ones: “It is full of shuijun² of merchants repeating good reviews. (Interviewer: Why do you think those comments are from shuijun?) It is so obvious because everyone repeats the same words. Useful information was quickly overwhelmed. These comments distract me from watching the live stream. I always turned the comment area off because it is annoying and useless.” (P1) Some interviewees thought these comments are even less reliable than comments on traditional e-commerce platforms: “The comments on Taobao websites are only written by people who have bought the products, which is quite objective. Anyone can write comments in live streams. I do not trust them.” (P5) The experiences of our interviewees suggest that information exchanges between unknown consumers in LSC do not help much with online shopping activities. Consumers have difficulties in distinguishing useful comments from excessive fake information.

² A group of internet ghostwriters paid to post online comments with particular content.

4.2 Afford Evaluations on Online Stores

The affordance of live streaming does not limit with the products themselves. In fact, live streaming also supports consumers' evaluations for merchants themselves. Consumers' perception of the online store has been enhanced by satisfying customer services, which encourages consumers to purchase products with the merchants.

Connectivity Between Merchants and Consumers For example, live streaming enables merchants to form personal relationships with their consumers and strengthen the ties with them, especially for small merchants. Because there are not many consumers participating in LSC of small merchants at the same time, merchants can have more interactions with the consumers and thus provide more personalized suggestions, which creates a more enjoyable shopping environment for consumers as in offline stores. P10 had such a good experience in LSC: "At the end of 2018, one of my friends recommended a merchant who sells clothes. Some of our friends joined that live stream every day for at least one week. It is not a big merchant, so she knew us quickly. It is delightful because the merchant can recommend us clothes according to our preference. Each of us bought at least ten clothes from that merchant." (P10) With such individual interactions with the merchant, P10 and her friends enjoyed good online shopping experiences and were satisfied with products they bought from the merchant. Social relationships between merchants and consumers are formed through live streaming communication.

Expandability of Additional Services Furthermore, some merchants provide additional services to attract and satisfy consumers. For example, some cosmetic merchants teach makeup skills in LSC: "Makeup requires some special skills. For example, if I use this beauty egg in different ways, I will have different looks. ... It is not that I do not know how to use it. It is a special skill (she taught us). If we don't understand how she made it, she will repeat until it is clear to us." (P6) P6 felt that she is not only attracted by the products sold by the merchants, but also the extra helps, which improves her understanding of the products she bought and experiences in using the products.

4.3 Afford Pleasure and Arousal

Arousal is considered as an affective property (dimension) ranging from sleep to frantic excitement (Mehrabian and Russell, 1974) and pleasure refers to valence of the affective state (Mehrabian, 1996). We find that the competition elements among consumers in live streaming leads to a high arousal, which enhances impulsive buying (Herabadi et al., 2009; Liao et al., 2016), while beneficial and

rewarding elements improve the pleasure of consumers in LSC and moderate shopping decisions (Wirtz et al., 2007).

Competitions Among Consumers Increase Arousal To increase the engagement of consumers, competitive games have been introduced to LSC. For instance, streamers may set explicit rules for shopping activities, e.g., the first buyers will earn additional prizes. Such competitions have positive influences on arousal during the decision-making process. P1 considers that sometimes she does not really want to buy the product but just feel it is interesting to get limited edition products: “He counted down from 5 to 1 before the product became available to everyone. I know a lot of people want to buy it, so I feel very happy if I am under the first one hundred people to get that product. Maybe I was not really interested in that product. But I earned happiness from beating others.” (P1)

Benefits and Rewards Increase Pleasures Sending virtual gifts to streamers is considered as a popular activity in live streaming (Lu et al., 2018, 2019; Wang et al., 2019; Wohn et al., 2018). However, in LSC, we observe an opposite phenomenon, such that streamers provide benefits to consumers in LSC. For example, streamers hold lottery activities in LSC.

Such beneficial and rewarding elements in LSC have increased consumers’ pleasure and attracted a lot of consumers’ attention: “She holds many lottery activities every day. When a lottery activity happens, the chatting space is full of lottery messages. Almost everyone (also those not interested in her LSC) is participating in.” (P13) The experiences of P13 indicate that these benefits and gifts encourage more people to join LSC or stay in LSC for a longer time after their online shopping activities. Moreover, pleasure generated by rewarding positively influence consumers’ goodwill and trust in the streamers, while they are more prone to be influenced by streamers in shopping decisions: “I think he is quite generous and often sends gifts to us, the audience. I feel like our relationship is like a friend, so I feel he won’t cheat us and sell us low-quality products.” (P7)

4.4 Challenges of Live Streaming in LSC

Although live streaming has supported the decision-making process in online shopping activities from several perspectives, we note that there are still challenges that need to be addressed, which greatly affected the development and sustainability of LSC.

The first significant challenge is related to the one-to-many communication. Although the communication mechanism can improve the efficiency of streamers to deliver information to consumers, the information received by different users is identical. Time-saving is considered as a decisive factor in the emergence and prosperity of the shopping paradigm (Chen et al., 2014; Koyuncu and

Bhattacharya, 2004; Van der Heijden et al., 2003). For experienced consumers, their time costs are relatively high because the information delivered in LSC is always redundant while they have already received the same information in previous practices. Almost all of our interviewees mentioned that the frequency of participation in LSC had been gradually decreasing: “I use less and less LSC for online shopping. I stared on my phone a whole night but only bought very few things. I feel it is a waste of my time.” (P16) Apart from the one-to-many communication mechanism, the repetition of products selling in LSC also decreases consumers’ willingness for shopping in LSC. Most streamers hold LSC at least three times a week, selling dozens of items each time, which results in recommending more than 500 products per month. Therefore, some products will appear in LSC with a higher frequency, far beyond the frequency of consumers’ repurchase of them, which distracts the efficiency of the information containing in each LSC.

5 Affordances and Challenges of Intermediaries in LSC

Live streaming does not only serve as a decision support system in LSC, but also enables market intermediaries to participate in the e-commerce practices. Many LSC streamers do not own their online stores. Instead they sell products through live streaming during a specific time slot and consumers can directly buy the products in their LSC.

Compared to merchants, LSC streamers have two distinguishable differences. First, the items they sell in LSC vary for each live streaming and consumers do not know at what specific time they will sell the products. Second, streamers have schedules for their presentations of different products. Therefore, consumers can only acquire information about a product and decide whether to buy it in LSC during a certain period of time. As intermediaries in the market, streamers directly communicate with consumers in their LSC. In other words, streamers control the communication channel with consumers in their LSC, while merchants cannot exchange information with consumers through live streaming in the presence of streamers.

LSC streamers can be mainly classified into two categories: *professional streamers* and *crossover streamers*. Professional streamers refer to those who do not participate in live streaming activities other than LSC, while crossover streamers were already active in other types of live streaming before they conducted LSC practices. Although there might be some overlaps between these two categories, the main difference between professional streamers and crossover streamers is whether their followers are attracted by LSC or other live streaming performances.

In this section, we aim to explore how streamers influence the consumer decision-making process at different stages. The participant of market intermediaries introduces additional affordances in the online shopping systems. We focus on three stages where streamers are most influential, i.e., shopping need awareness, decision making, and post-purchasing evaluation.

5.1 Stimulability for shopping needs awareness

Some consumers may not have a clear shopping awareness when they participate in LSC. The majority of consumers (58.5%) participate in LSC because they want to buy something recommended by streamers but without a clear goal. Therefore, streamers arouse the shopping need awareness of consumers in LSC. According to our respondents' replies, we summarize five different scenarios to examine the stimulability for shopping needs awareness.

Attending LSC Practices Streamers first attract consumers to participate in their LSC practices and then make them interested in the products they sell. Crossover streamers have significant advantages at this stage. Because they have accumulated considerable fame and knowledge in their specialized fields, consumers have a natural belief in their specialization. P5 is a sports fan and has followed many sports streamers on live streaming platforms. He attends LSC because of his recognition of his favorable streamers: "I like sports, especially basketball. My favorite streamer on TikTok is Junge, and I have followed him for a long time. He sometimes sells basketball jerseys in LSC. I often buy basketball equipment from him because I trust him in sports." (P5) On the contrary, crossover streamers are only recognized in the specific domain. The majority of products selling through LSC have to be related to their expert fields. Their followers may not trust crossover streamers when they sell something far away from their expertise: "I do not buy other products from her (a make-up streamer). I don't trust the snacks she recommended. I tried it once and found it does not taste good. I prefer buying snacks from another streamer." (P16)

Resonating with Consumers After leading consumers into live streaming, streamers introduce the products they sell to raise consumers' shopping need awareness. LSC streamers use products they sell to conduct performances. For example, they eat food during LSC and sell the same product to their audience; or make up with the cosmetics they sell in LSC. The audience may have a high recognition of items that are used in live streaming performance (Anjani et al., 2020). When asked about the most impressive LSC experience, some respondents of our survey mentioned that they buy products when looking at their live streaming performance with the products: "I bought rice noodles in a mukbanger's LSC. Wow, I looked at how the streamer ate the noodles and heard the sound he made. The

noodles seemed very, very delicious! Each package has a large volume as well, so I bought the noodles right away.”(S226)

Improving Online Shopping Engagement Moreover, streamers invite consumers to participate in their performances and create a stronger sense of engagement of the consumers to enhance their interests in the products. For example, when selling food, streamers follow consumers’ suggestions to taste the food they are interested in. Consumers can express which products they would like to watch streamers eat and build a stronger sense of identity with the food when watching live streams (Choe, 2019). This also happens when streamers make up with beauty products. P6 felt excited when the streamers interact with her during the live streaming performance: “He (a make-up streamer) will ask audiences which lipstick we would like him to try first. If he tries the color that I recommended, I feel very happy. I cannot stop buying it (the lipstick he tries) even if I have a lot of lipsticks.” (P6)

Non-intentional Shopping Awareness in LSC Sometimes consumers do not have a clear goal for shopping when they watch live streams. Streamers may influence consumers’ shopping decisions because they offer useful and interesting items to consumers. P16 tells us that when she felt boring, she would open LSC and watch the performance of streamers. Although she does not have a specific desire to shop, she occasionally places orders with the streamers: “Sometimes they sell toilet paper at a very low price. I asked myself: why don’t I buy it? I always need it anyway. So I bought it for no other reason, just for the low price.” (P16)

Non-LSC Practices Apart from enhancing shopping need awareness during LSC, some crossover streamers also utilize consumers’ interest in props that they use during their non-LSC live streaming practices to sell products. Because these props always appear in their performance, consumers’ recognition of the props will gradually deepen as they favor the streamers’ performance: “I usually learn how to bake from her live streams, and I felt that her supplies were very professional and good. That time she sold the baking tools she was using in the LSC, so of course, I bought some.”(S125)

5.2 Influenceability on Shopping Decisions

In LSC, the most information consumers acquire is from streamers, while their evaluations on the products are influenced by how much they trust from the information resource. Meanwhile, their evaluations of streamers also determine their final decisions of purchase. In this subsection, we explore how the identity of streamers influences consumers’ evaluation of products and themselves.

LSC streamers may not be bonded with other merchants. Because the identity of streamers and the identity of merchants can be independent, consumers

perceive that streamers can provide objective opinions on the products that they sell. Our survey respondents consider these perceived objective opinions bring them good online shopping experiences: “Last time I bought a laptop from him. He did not only say how good the laptop is but also analyzed its weakness and whether it is suitable for us, which made me understand the advantages and disadvantages. It is more useful than those merchants only tell you it is good.” (S166) If consumers perceive that streamers present unbiased stances, streamers’ words are convincing to consumers when deciding whether and what to buy.

Moreover, some streamers utilize “Lianmai” (Li et al., 2019) function to conduct co-selling practices, where audiences of two streamers can watch the performance of two streamers in the same interface. In co-selling, one streamer does not sell anything, while the second streamer is a merchant. The first streamer brings all her audience to LSC, watches how the merchant presents the product, and negotiates with the merchant about the product’s price. The streamers always perform as represents of consumers to persuade the merchant providing a better price or offering extra gifts: “The reason that I liked him is he always fights for his audiences with other streamers. I could feel that he really wanted us all to be able to buy the product at the lowest possible price.” (S32) In the form of co-selling in LSC, streamers companion with consumers during the entire decision-making process and perform as the representative of the consumers to negotiate with the seller, which makes consumers feel like a more immersive online shopping experience.

5.3 Reliability of Post-Purchasing Services

As the third party in LSC between merchants and consumers, streamers also involve in the post-purchasing evaluation stage of the consumer decision-making process, which improves the reliability of such services (Adjei et al., 2010; Archer and Yuan, 2000; Salam et al., 2005; Singh, 2002; Sutanonpai-boon and Abuhamdieh, 2008).

Some streamers provide additional after-sales services paralleling with merchants, which improves consumers’ recognition of them and encourages them to conduct online shopping practices with the streamers in the future. Streamers act as mediation agents to coordinate or solve conflicts between consumers and merchants: “He (a streamer) had a collaboration with the merchant, and he promised that the merchant would send us a lipstick of the most popular color as a gift for every order. But the merchant sent some random colors to us. I feel I was cheated and contacted the customer service of the streamer. They helped me contact the merchant to send me the correct gifts.” (P8)

By playing as a neutral third party helping consumers solve after-service problems, streamers make consumers more assured of shopping through LSC. Although such after-sales services cannot directly influence consumers' shopping decisions of the previous shopping decisions, the help provided by streamers can strengthen consumers' recognition of the streamers, which will positively influence future shopping decisions in LSC with the same streamers.

5.4 Challenges of Streamers in LSC

Although streamers in LSC provide various affordances in consumers' decision-making process, we also find our respondents perceive challenges of the involvement of streamers in LSC.

First, some streamers encourage consumers to perform impulsive buying. For example, they might repeat how useful the product is, how cost-effective the product is, and how a limited number of items are available, to invoke consumers' desire to buy the product. P8 considers that she is easily influenced by such incitement: "He keeps repeating that it is the best offer that we can have forever, i.e., the first one is the original price, the second item is half price, and the third one is free, etc. He lets me feel that if I don't buy it, I am an idiot and will lose money." (P8) When consumers are immersed in live streaming, they do not have time to look for information outside the live stream, which may cause a lot of irrational shopping behaviors.

Second, some coalitions may exist between streamers and merchants, while streamers may deliver deceptive information to consumers. For instance, in the form of co-selling in LSC, rather than authentically helping customers make bargains, the streamers conspire with merchants to deceive consumers: "It seems that they were just performing for us. Two streamers spoke very loudly to attract my attention. They quarreled with each other and kept saying something like, 'The original price was more than 100. Now! Only for my audience, the current price is 9.9!' I just felt that they were deceiving me. It is the same performance every time." (P3) Consequently, these streamers may lose credibility from consumers.

In LSC, streamers dominate the entire shopping process. Consumers' perception of the selling products is based on how streamers present products. Meanwhile, the entire shopping experience in LSC is coherent, in which consumers complete the whole process from receiving information to purchasing products within the same interface. Therefore, external information from a third party cannot affect user perception during the period, while the information provided by streamers has been gradually enhanced. All these factors contribute to the fact that streamers are powerful in LSC, and they may deliver fake information to get extra benefits from consumers (Yi, 2020).

6 Discussion

In this paper, we analyze the purchase decision-making process of consumers in LSC. LSC has two unique features compared to other e-commerce models: the live streaming as a decision support system, and streamers as market intermediaries. We find that the decision support system improves the evaluation of products and online stores at the information search and the alternative evaluation stages, while the market intermediaries influence consumers at the shopping need awareness, deciding to purchase, and the post-purchasing stages. On top of understanding the affordances and challenges of current LSC, we proceed to discuss the uniqueness of LSC that distinguishes it from other e-commerce models, and implications for the LSC service providers and research communities.

6.1 Offline-like Online Shopping Experiences

Online shopping has many advantages compared to offline shopping (Katawetakarakas and Wang, 2011). For example, online shopping is considered more convenient (Wang et al., 2005), because it provides services with consumers 24 hours a day, 7 days a week and avoids crowds and waiting lines. Moreover e-commerce offers consumers more variety of available products and services (Lim and Dubinsky, 2004). Compare to traditional e-commerce, LSC provides offline-like online shopping experiences with consumers regarding to the following perspectives: intangibility of products and social contact.

6.1.1 Intangibility of products

Consumers are less likely to buy some types of products because they can not try or examine the actual products through the online channel (Comegys et al., 2009), especially for the products such as clothes, which have significantly different effects by observing from e-commerce websites and seeing in the stores. Moreover, the information provided by the e-commerce websites always cannot meet the expectation of consumers when they make purchasing decisions (Liu and Guo, 2008).

LSC optimizes the intangibility of products from both the technical perspective and the human perspective. Live streaming technology delivers more informative messages to consumers, including images, actions, and voices. With the information of these different senses delivered by live streaming, consumers may imagine the actual effect when using the products. They can better examine the products like clothes and are now willing to purchase these products in

LSC. Although live streaming cannot provide the same shopping environments as offline stores, it optimizes the online shopping experience, both visually and audibly.

Moreover, although consumers cannot directly see, hear, feel, touch, smell, or try the product themselves in LSC, they can empathize with the streamers who use the products. With the development of trust and recognition of streamers, consumers can evaluate the products from the real-time reactions and feedback from the streamers through live streaming, which decreases the intangibility of online shopping.

6.1.2 Social Contact

Both the assistance from professional salespersons and opinions from other consumers are helpful for people to make shopping decisions (Prasad and Aryasri, 2009). By establishing real-time communication with merchants, introducing streamers, creating shopping environments with many consumers, and encouraging interactions with acquaintances, the social contact of consumers has been greatly enriched in LSC compared to other traditional e-commerce.

First, consumers can interact sufficiently with merchants, streamers and other consumers during the online shopping practices. Based on the affordance of the combination with hot media (streaming image) and cold media (text chat) (Hamilton et al., 2014), consumers can actively express their doubts, needs, and opinions to streamers and other consumers as well, to construct an interactive online shopping environment and develop shared histories. The various interactions within LSC can be considered as a major difference compare to TV shopping channels. Although TV shopping also supports the parasocial interaction between consumers and hosts, LSC enhances this interaction with different LSC affordances and even extends to the parasocial interaction between different consumers.

Second, streamers can easily influence consumers' emotions in LSC. Apart from the affordances of arousal and pleasure that we reported in Section 4.3, consumers also engage in live streaming performances and other entertaining activities in LSC. Their online shopping practices have changed from pure purchasing to comprehensive commercial and entertainment practices similar to offline shopping.

Third, streamers also strengthen their relationships with consumers outside LSC, such as after-sales services provided by streamers and other live streaming practices conducted by crossover streamers. Moreover, because LSC and streamers may become common topics between people who have close relationships, their recognition of LSC has been deepened, and they are more likely to join in LSC together.

6.2 Implications

Although we take the online shopping activities in Chinese LSC as an example in this paper, we do not aim just to report specific content in China. In this subsection, we discuss the implications from three perspectives based on our findings and beyond the specific content, namely from service providers and researchers.

6.2.1 LSC Service Provider

Since live streaming is a novel decision support system in online shopping, there are still challenges in the current LSC system. Therefore, we discuss the design implication of LSC systems from two perspectives: providing various functionalities for different users and providing external choices. Moreover, we discuss more general implications regarding the development of LSC.

Design Implications First, as experienced users perceive that they receive repeated information in LSC, which decreases their shopping efficiency, LSC service providers may consider consumer triage to provide multiple modules in parallel to meet the different needs of consumers. For example, LSC can set two phases for placing the order before and after the introduction, where experienced users can save time to buy products efficiently, while new consumers can wait until getting enough information for making shopping decisions. The behavior of consumers in the early phase can also be used as references for new consumers. The purchase data might be more objective than text messages sent by other consumers in LSC. Similarly, LSC service providers may also consider to share the information of the current on sale products on other social media or pushing notifications in real-time to enable experienced consumers to participate in LSC at a precise time. They can skip the time of repeated products or something they are not interested in. Thus, consumers can save more time without participating in a low-informative LSC period.

Second, as we discussed in Section 4.1, in current LSC, consumers cannot take peers evaluation on products as helpful eWOM for shopping decisions. Therefore, LSC may introduce external information to help consumers build an objective view of products and eliminate streamers' dominance. For example, LSC can display information from external resources in the interface, such as consumers' reviews on e-commerce platforms or discussions about products on social media. Consumers will have access to this third-party information from different sources during the shopping process and be more rational when making shopping decisions.

General Implications LSC has become a popular e-commerce model in China. However, it has not been fully accepted in other countries. We explore two main

reasons for the success of LSC in China to inspire the future development of LSC all over the world.

First, Chinese users have developed the habit of using live streaming (Lu et al., 2018). As the most popular entertaining applications, streaming/video platforms have taken up most Chinese users' leisure time (CINIC, 2020). Therefore, we may expect the future development of LSC on streaming/video platforms in other countries as well if they can build their own e-commerce services. Although such a combination of streaming/video platforms and e-commerce content encourages users to adapt LSC, we also notice the potential negative impact of commercial content on non-intended users on video/streaming platforms. As part of video/streaming platforms, LSC will be pushed to users when browsing non-commercial content based on personal information they share on social media (Qin and Jiang, 2019). Even though some consumers think it is enjoyable to shop in a relaxing environment, some other impulsive consumers might be seriously influenced by LSC and conduct irrational or emotional shopping behavior (Eastin et al., 2016). On the other hand, the system algorithm may not fully understand user behavior on the video/streaming platform, and the recommendation might not be accurate, which could be harmful to consumers (Brockell, 2018). Therefore, these non-e-commerce platforms should allow consumers to opt out of LSC from the platform.

Second, shopping sites are very thoroughly integrating live streaming features. As we have shown in Figure 1, e-commerce platforms actively guide users to join LSC from the traditional e-commerce platform and even offer additional discounts. Consumers are prone to accept live streaming services with such repeated experiences. For instance, Aliexpress has attracted global users to participate in LSC with their attempts (Wei, 2020). However, other more popular e-commerce platforms have not fully adapted LSC, which may postpone the development of such an e-commerce model over the world.

6.2.2 *Research Community*

Our paper focuses on the decision-making process of consumers in LSC. We obtain many new observations and findings, which help people have a deep understanding of LSC. This study raised, but did not answer, many interesting and important questions that we commend to future researchers (including ourselves):

- What are the differences in consumer practices in LSC on e-commerce platforms and streaming platforms? How do consumers perceive the affordances on different platforms?
- How do streamers interplay and negotiate with merchants? How do they sell products with a lower price of products than merchants?

- How do streamers manage their relationships with their consumers online and offline?

LSC has become an interdisciplinary topic of computer science, business, management, psychology, and sociology. Because of the limitation of our data (we only collect data from experienced consumers but not other stakeholders in LSC), we may not explore all aspects in this paper. However, we expect future work to contribute to understanding this increasingly important topic from different perspectives.

7 Conclusion

In this paper, we study an emerging socio-technological phenomenon, i.e., LSC in China, to understand how consumers' shopping decisions are influenced when live streaming combines e-commerce. We examine the new e-commerce model from the technical and human perspectives. Our work does not only provide insights into how LSC becomes successful but also considers the current limitations of LSC. We provide implications to address existing issues and inspire LSC service providers, market intermediaries and research communities.

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Declarations

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