To stream or not to stream? Exploring factors influencing impulsive consumption through gastronomy livestreaming

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Authorship:

Cheng Yu
School of Business, Macau University of Science and Technology, Macao, China, and
Graduate School of Foshan, Beijing Foreign Studies University, Foshan, China

Jun-Hwa Cheah
Senior Lecturer
School of Business and Economics, Universiti Putra Malaysia, Serdang, Selangor, Malaysia.
Email: jackycheahjh@gmail.com

Yide Liu*
Associate Professor
School of Business, Macau University of Science and Technology, Taipa, Macau
Email: ydliu@mut.edu.mo

***Corresponding author**

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Abstract

Purpose – In China, the practice of livestreaming while shopping has evolved from a form of entertainment into a new business strategy. In recent years, the gastronomy industry has also adopted livestreaming as a means of online promotion. Based on the stimulus–organism–response (S-O-R) theoretical model, this study investigates the effects of gastronomy livestreaming on viewers' impulsive consumption by considering gamification, perceived professionalism, and telepresence as causative factors.

Design/methodology/approach – We conducted a survey of gastronomy livestreaming viewers that received 1093 responses. The effects of gamification, perceived professionalism, and telepresence were then analyzed using partial least squares path modeling (PLS-PM) and necessary condition analysis (NCA).

Findings – This study finds that gamification, perceived professionalism, and telepresence are sufficient conditions for explaining impulsive consumption. Innovativeness mediates the relationships between these factors and impulsive consumption. Furthermore, gamification and innovativeness represent necessary conditions for impulsive consumption.

Practical implications – The findings of this study contribute to an enhanced understanding of livestreaming in the gastronomy industry. Based on these findings, managers in the gastronomy industry can utilize more interactive gamification activities and enhance telepresence to increase viewers' impulsive consumption during livestreaming sessions.

Originality/value – This study identifies the modalities through which gastronomy livestreaming can stimulate impulsive consumption. This is an early study to investigate the effect of experiences of gamification, perceived professionalism, and telepresence on

viewers' impulsive consumption in the context of gastronomy livestreaming. In addition, this early study investigates the effect of gastronomy livestreaming innovativeness on impulsive consumption.

Keywords: gamification, perceived professionalism, telepresence, gastronomy livestreaming, innovativeness

1. Introduction

Gastronomy has long represented a form of sensory escapism for travelers and locals alike (Okumus *et al.*, 2018). Watching livestreaming of gastronomic information on social media and mobile devices can allow consumers to feel included in an elegant and luxurious lifestyle through real-time interaction with streamers. Distinct from pre-recorded promotion videos on YouTube, Bilibili, etc., livestreaming e-commerce in China can provide an immersive experience in real time and allow streamers to interact with a mass audience. By watching a streamer's explanation on livestreaming platforms like TikTok and Taobao, viewers can obtain detailed gastronomy information that could encourage them to place orders immediately or at a later time. In addition, current livestreaming platforms can retain viewers' attention effectively through the use of gamified entertainment and task-completing functions, such as coupon incentives, to engage viewers (Li *et al.*, 2020).

Chung *et al.* (2017) stressed the strategic potential of livestreaming to encourage impulsivity by promoting both motivation and positive feelings toward gastronomy. Through unfiltered displays of appreciation for food or skillful cooking performances, as well as the emotional exchange between livestreamers and other participants, this medium has the potential to influence viewers to make impulsive purchases of food or restaurant vouchers. For instance, in a collaboration with Starbucks in September 2019, famous livestreamer Weiya promoted the bourgeois literary connotations of coffee on the Chinese shopping platform Taobao to potential consumers in China. Unexpectedly, 8.29 million fans watched the live video that night and 160,000 coffee coupons were sold in just half an hour (*Sohu News*, 2019).

Gastronomic experience is a crucial success factor for tourism (Wondirad *et al.*, 2021). According to Bertan (2020), many tourist destinations offer food to meet the growing culinary desires and interests of travelers. Therefore, showcasing authentic culinary products through livestreaming also projects a positive image of the destination, and it enables the

promotion of local culture. Compared with pre-recorded or edited short videos, gastronomy livestreaming authentically presents the culinary image, producers, gastronomic events, quality tastings, and other food-related activities of a destination in real time (Pavlidis and Markantonatou, 2020). For example, James Liang, CEO of Ctrip group (the leading online travel agency in China), and Wang Yingwei (president of Sands China) acted as livestreamers in December 2020. They enjoyed British afternoon tea at The Londoner Macao casino resort, introducing British culture to their viewers. The livestream was watched by 5.463 million people, and it successfully promoted the restaurants and hotels of The Londoner Macao (*Chinanews*, 2020).

In contrast to traditional e-commerce, gastronomy livestreaming can provide a panoramic view of the dining environment, unique service delivery, and the artistry of catering (Zhang *et al.*, 2020). Gourmets and streamers can describe every facet of their gastronomic experience, such as the ingredients, new dishes, culinary skills, history, craftsmanship, and culture. These details are intended to influence viewers' judgments instantaneously through real-time videos. Besides presenting the food, gastronomy livestreaming also stimulates viewers with entertainment experiences and game components, such as bullet screen interaction, sending gifts to favorite streamers, and receiving badges (Li *et al.*, 2020). In addition, viewers can also complete certain tasks for incentives and rewards.

Although livestreaming has attracted attention as a fashionable form of e-commerce, not all gastronomy livestreaming campaigns successfully stimulate unplanned purchases. In fact, 70% of streamers in China have small followings and low sales performance (Beijing Consumers Association, 2020). It is, therefore, necessary to investigate potential factors in gastronomy livestreaming that promote impulsive consumption. To date, few studies have discussed gastronomy experience marketing in the context of livestreaming. Most research on livestreaming commerce has focused on the perceived values and motivations of livestream

viewers (Chen *et al.*, 2020; Sun *et al.*, 2019), neglecting the mechanisms of the livestream itself (Fei *et al.*, 2021). According to Mishra and Mishra (2010), consumers' impulsive choices can be attributed to contextual factors, such as food attributes and the experience of the environment. Compared to traditional e-commerce, the attributes of gastronomy livestreaming (e.g., the experience of gamification or telepresence and the perceived professionalism of streamers) present novel ways to incline viewers toward impulsive consumption. Hence, it is necessary to evaluate the applications of gastronomy livestreaming to marketing by considering these important intrinsic drives.

Other studies have investigated the effect of a stimulating shopping environment on responses such as impulsive consumption, and they have shown mixed results (Ding and Lin, 2012). While some studies have identified positive effects (Morin *et al.*, 2007), others have suggested that a stimulating environment may negatively influence impulsive purchasing (Smith and Curnow, 1966). These inconsistencies highlight the need for further research into other factors (i.e., telepresence, perceived professionalism of streamers, and the gamification experience) that may influence impulsive consumption, especially in the context of gastronomy livestreaming.

Studies have focused on analyzing the direct effect of various aspects of online merchandizing on impulsive consumption, including product types, hedonism or self-construal (Martinez-Lopez *et al.*, 2020). As participants in a new type of e-commerce, viewers feel as if they are at the forefront of a trend when they rise in leaderboards or earn bonus points by completing assigned tasks through livestreaming (Li *et al.*, 2020). Thakur *et al.* (2016) have suggested a positive relationship between technological innovativeness and impulsive consumption intention. In fact, innovativeness is an important predictor of unplanned buying (Floh and Madlberger, 2013). This characteristic influences the way individuals' cognitive and decision-making processes react when faced with new sensations, experiences,

communication, or products in their environment (San Martín and Herrero, 2012). However, researchers have not addressed the effects of innovativeness in a livestreaming context. For this reason, much remains to be discovered in terms of how livestreaming innovativeness can explain and predict unplanned purchases in the context of gastronomy livestreaming.

In view of these research gaps, three research questions are proposed:

i. Do factors such as gamification, perceived professionalism, and telepresence of gastronomy livestreaming influence viewers' impulsive consumption? What are the most important drivers of viewers' impulsive consumption?

ii. How do gamification, perceived professionalism, and telepresence influence viewers' perception of the social innovativeness and hedonic innovativeness of gastronomy livestreaming?

iii. Does the social innovativeness and hedonic innovativeness of livestreaming influence viewers' impulsive consumption?

Through the analysis of survey data collected from 1093 gastronomy livestreaming users in China, this study makes several contributions. First, this study identifies the causes of impulsive consumption in the context of gastronomy livestreaming by conducting a preliminary inquiry into the influence of gamification, perceived professionalism, and telepresence. Second, this study represents an initial attempt to explore and predict the influence of gastronomy livestreaming innovativeness on impulsive consumption. By adopting Stimulus–Organism–Response (S-O-R) theory (Mehrabian and Russell, 1974), this study considers the attributes of livestreaming as stimuli, the perception of innovativeness as an organism, and impulsive consumption as a response. Finally, this study uses both partial least squares path modeling (PLS-PM) and necessary condition analysis (NCA; Dul, 2015; Hair *et al.*, 2021; Richter *et al.*, 2020) in examining the effects of gamification, perceived

professionalism, and telepresence on livestreaming innovativeness and impulsive consumption.

2. Literature Review and Hypotheses

2.1 Stimulus–Organism–Response (S-O-R) theory and gastronomy livestreaming (stimuli)

According to the S-O-R theory, all human behaviors can be explained as a series of corresponding responses generated by the organism under the action of stimuli (Mehrabian and Russell, 1974). The S-O-R model is widely used to analyze the influence of the external environment on human behavior (Lim, *et al.*, 2020). This is exemplified in the study of online impulsive consumption conducted by Setyani *et al.* (2019); in this application of the S-O-R model, researchers regarded personalized advertisements as the stimuli, clicking motivation as an organism, and the outcome of impulsive buying intention as a response. Drawing from this notion, the present study aims to investigate gastronomy livestreaming by considering the attributes of livestreaming as the stimuli, the perceived innovativeness as an organism, and impulsive consumption as a response.

Previous studies concerning gastronomy consumption have discussed the effects of visual stimulation on the interactions between food providers and tourists (Prayag *et al.*, 2020; Taheri *et al.*, 2021). Compared to other formats of promotion, such as edited pictures, pre-recorded videos, and consumers' comments, livestreaming is a more reliable manner of presenting the authenticity of gastronomy to stimulate a response like the intention to purchase. Using cameras and computers, livestreaming can broadcast live video content with high interactivity and entertainment value (Li *et al.*, 2020). Moreover, popular streamers are influencers of livestream viewers. For instance, Weiya, the streamer mentioned above, is admired by a large fan base, and she works with her team to select only high-quality products for promotion. Furthermore, there are cases of sponsored livestreaming with advertising recognition. The drawbacks (i.e., exaggerated information regarding the authenticity of gastronomy) can be mitigated by the immersive display and the streamers' charm (De Jans *et al.*, 2020; Sokolova and Kefi, 2020). Thus, gastronomy livestreaming has become a credible

solution to broadcast the process of food preparation, showcase gastronomic qualities, answer questions in real time, and organize live activities that entertain and encourage viewers to make purchases without hesitation (Floh and Madlberger, 2013).

Gamified designs are in widespread use across livestreaming platforms. Livestreaming viewers can unlock badges, climb leaderboards, and earn bonus points (e.g., discount coupons and virtual gifts) by completing assigned tasks. These tasks include sending bullet chats, following the streamer, commenting, visiting a product page, and making purchases. These interactions can help to influence consumer involvement and function as a conscious replacement of the shopping experience as a form of entertainment (Hollebeek *et al.*, 2021).

In addition, gastronomy livestreaming allows streamers to share their gastronomy expertise with their viewers. In addition to presenting the food, a livestream can also be a vehicle for detailed explanations of ingredients, price, texture, tastes, and brands, as well as cultural storytelling. The rich information offered by experts, together with fully demonstrated culinary techniques, can help viewers digest the gastronomic information more effectively and become attracted to impulsive consumption (Lueg and Finney, 2007).

Furthermore, livestreaming can facilitate an immersive engagement with gastronomy (Steuer, 1992). Portable filming equipment, fill-in lights, and high-technology smartphones allow streamers to broadcast food tasting and physical dining environments vividly. For instance, the livestream of the HaiDiLao hot pot restaurant chain allows viewers to watch a boiling spicy hot pot in real time, listen to the sound of boiling in the pot, and view the streamers' expressions (*Sohu News*, 2020). The sensory experience virtually transports viewers to the location, transcending physical and geographical limitations (Kang *et al.*, 2018).

Mishra and Mishra (2010) identified the effect of contextual factors on consumers' impulsive choices. In gastronomy livestreaming, both food and the streamer should be regarded as contextual factors influencing viewers' impulsive choices (Fei *et al.*, 2021). According to

attribution theory, viewers' impulsive consumption of gastronomy should be based on internal factors like cognitive perception and external factors like task difficulty (Heider, 1958). The internal factors refer to the viewers' evaluation of the streamer and the gastronomy presentation. Streamers are indispensable sources of gastronomic information, so they are closely connected with the viewer's goal of watching livestreaming while purchasing. This immersive exhibition plays an important role in attracting viewers' attention by delivering gastronomy information in an evocative and engaging manner. The external factors can include perceptions of playfulness based on the interactive messages and challenging tasks that gradually appear on the screen. Therefore, this study considers gamification, perceived professionalism, and telepresence as the stimulus attributes of livestreaming in the S-O-R model.

2.2 Impulsive consumption (response)

Buying impulsiveness is constructed as a consumer's tendency to buy spontaneously, unreflectively, immediately, and kinetically (Lim *et al.*, 2020; Rook and Fisher, 1995). Beatty and Elizabeth Ferrell (1998) define impulse buying as a sudden and immediate purchase with no pre-shopping intentions, either to buy in a specific product category or to fulfill a specific buying task.

On a gastronomy livestreaming platform, viewers can accumulate points and unlock badges by completing specific tasks. The reward mechanisms (e.g., coupons and virtual gifts) can motivate viewers to earn more points, unlock more badges, and experience feelings of playfulness (Feng *et al.*, 2018). The more rewards and incentives earned from game design, the more enjoyment the viewers feel. This ultimately encourages them to make an impulse purchase on the livestreaming platform (Floh and Madlberger, 2013). When viewers watch a stream and join in with games on the livestreaming platform, they are likely to be exposed to more gastronomic information. This provides further opportunities for viewers to form the intention to buy impulsively (Huang, 2016). Therefore, we hypothesize:

H1. Gamification of livestreaming has positive effects on impulsive consumption.

Expertise is perceived the ability to provide correct information and elicit agreement through persuasive communication (Ohanian, 1990). Expertise can make receivers feel confident about not checking the veracity of the source's assertions (Bansal and Voyer, 2000). Flanagin and Metzger (2007) argued that the perception of professionalism is determined by the accuracy and quality of the information in the online environment. Therefore, streamers with gastronomy expertise can provide trustworthy information, such as information about ingredients, restaurant information, and new offerings (Huang *et al.*, 2020). Finally, the high intensity and effectiveness of professional communication could increase the effectiveness of gastronomic stimuli (Liu *et al.*, 2021).

The quality and professionalism of online communication strongly influence consumers' unplanned buying (Lueg and Finney, 2007). When viewers have confidence in the information presented to them, they are spared the time and effort required to verify it; in this way, they are directly assisted by reliable professional streamers (Setyani *et al.*, 2019). Thus, perceived professionalism increases viewers' interest, validation, and mutual understanding, which fosters a sense of loyalty and intimacy (Lyu *et al.*, 2021). This is evidenced by the results of the study carried out by Verhagen and van Dolen (2011). They found a significant association between rich product experiences and impulse buying. When viewers think of the streamers as credible and knowledgeable, they are more likely to engage in unplanned consumption (Setyani *et al.*, 2019). Therefore, we hypothesize:

H2. Perceived professionalism of livestreaming has positive effects on impulsive consumption.

Livestreaming enables streamers to introduce and present their products to viewers in real time, and the richness of video and animation can entice multiple senses. Furthermore, interactive and vibrant features are central to viewers' online experience (Rook and Fisher, 1995). This virtual experience encourages the sense of telepresence by exploring the

gastronomy and dining environment, allowing viewers to immerse themselves in a dynamic sensory tour. Lee *et al.* (2020) and Ou *et al.* (2014) have established that telepresence contributes to positive customer purchase intention. Thus, immersive experiences through livestreaming can cultivate viewers' intention to visit and dine in a particular restaurant, as they find such platforms seamless and engaging. Other studies suggest the importance of immersive experiences in relation to impulse buying (de Kervenoael *et al.*, 2009; Shen and Khalifa, 2012). For example, de Kervenoael *et al.* (2009) demonstrated the positive effects of social media e-atmospherics on impulse buying. Therefore, we hypothesize:

H3. The telepresence of livestreaming has positive effects on impulsive consumption.

2.3 Innovativeness (organism)

2.3.1 Gamification and innovativeness

Innovativeness refers to individuals' willingness to adopt new ideas relatively early (Anić *et al.*, 2018; Im and Workman, 2004). Viewers who watch or consume gastronomy through livestreaming may perceive themselves as innovative or as trend pioneers. Vandecasteele and Geuens (2010) measured innovativeness by considering both emotional judgment and rational judgment. Emotional judgment includes both social innovativeness and hedonic innovativeness. The former can be motivated by the need for differentiation, while the latter refers to positive feelings that accompany new experiences. Rational judgment is defined by purchasing intention toward new offerings. This study uses both the social and hedonic dimensions of innovativeness, as they could lead to logical overlaps or statistical errors in measurement (e.g., discriminant validity error) when analyzing the effects of purchasing intention (rational judgment) on impulsive consumption.

In the context of gamification, innovation is characterized as preference or openness toward new and atypical objects (Kolar and Čater, 2018). Gamification of gastronomy livestreaming (e.g., point collecting, badge unlocking, and unscheduled coupon distribution) is a practice on the forefront of marketing innovation. These activities play an indispensable role in increasing viewers' involvement, and they constitute a conscious replacement of the buying experience as a form of entertainment (Insley and Nunan, 2014). An attempt at gamification can increase the perceived enjoyment and make the experience more exciting

for viewers (hedonic innovativeness; Zhang *et al.*, 2020). In addition, the need for social innovativeness is satisfied when gamified elements include leaderboards, badges, and tasks, as these rankings allow viewers to publicize their performance and compare their accomplishments with others (Bitrián *et al.*, 2021). Hur *et al.* (2017) found that the perceived playfulness of gamification is the key ingredient for fashion innovators that seek to develop social and hedonic feelings. Therefore, we hypothesize:

H4. Gamification of livestreaming has positive effects on (a) social innovativeness and (b) hedonic innovativeness.

2.3.2 Professionalism and innovativeness

Experienced food experts, qualified food critics, award-winning cooks, and experienced food bloggers are suitable endorsers of food products and services. When these experts become streamers to present their knowledge in gastronomy livestreaming, viewers perceive their professionalism and trust their expert information. As opinion leaders, professional streamers can communicate their knowledge of and passion for gastronomy. They have mastered the skills of media operation (e.g., viewer behavior analysis, live content design and promotion), thus their messages are perceived as more creative (Goldsmith *et al.*, 2000).

In addition, many individuals are overwhelmed by the volume of information available online, such as disparate customer feedback, inaccurate comments, and unclear pictures of food. An interactive gastronomy livestream can circulate professionally styled representations of food, preparation, or fine dining environments that are tailored to viewers' preferences. The gastronomic content can be well prepared by streamers with a professional demeanor to suit their target viewers, thereby leading to novel feelings that "distinguish me from others" (Setyani *et al.*, 2019). Therefore, we hypothesize:

H5. The professionalism of livestreaming has positive effects on (a) social innovativeness and (b) hedonic innovativeness.

2.3.3 Telepresence and innovativeness

The role of telepresence in gastronomy livestreaming is critical for assuaging feelings of risk or uncertainty (Lee *et al.*, 2020) regarding a future dining experience. Telepresence allows

viewers to feel as if they are personally in the restaurant. If gastronomy livestream viewers feel immersed in the telepresence environment, they can perceive detailed information about the food and generate positive emotional connections.

Through full online engagement, heightened enjoyment, sensory curiosity, and interaction with streamers and food driven by livestreaming technology, viewers can feel included in the creative virtual environment. This allows for viewer involvement beyond passively reviewing the textual descriptions of food or the comments of experienced clients (Wei *et al.*, 2019). Thus, the experience of telepresence, especially in high-end establishments, can be considered original, unexpected, or meaningful (Setyani *et al.*, 2019). Fully immersive livestreaming with a highly interactive interface can lead to greater social and hedonic innovativeness (Bogicevic *et al.*, 2021). Therefore, we hypothesize:

H6. The telepresence of livestreaming has positive effects on (a) social innovativeness and (b) hedonic innovativeness.

2.3.4 The link between innovativeness and impulsive consumption

Through rich external information, innovative consumers can reduce the perception of risk (Floh and Madlberger, 2013), and the concept of innovativeness has been used to understand the role of impulsive consumption (Chung *et al.,* 2017). In addition, social and hedonic innovativeness has been found to affect consumers' perceptions of prices (Fowler and Bridges, 2012).

In the context of gastronomy livestreaming, viewers can quickly learn about the food or establishments that interest them. In addition, streamers also emphasize the social status, prestige, and symbolic aspects of gastronomy. Viewers of gastronomy livestreaming are more likely to understand the preparation and efforts associated with gourmet cooking and to perceive the relevant prices as justifiable and fair (Li *et al.*, 2020). Aldás-Manzano *et al.* (2009) and Martinez-Lopez *et al. (*2020) have found that innovativeness can reduce perceived risk and increase consumers' impulse buying tendency on any e-commerce platform. This

evidence also supports the finding of Anić *et al.* (2018) that there is a positive relationship between innovativeness and impulse buying tendencies. Therefore, we hypothesize:

H7. The (a) social innovativeness and (b) hedonic innovativeness of gastronomy livestreaming have positive effects on impulsive consumption.

2.4 The mediating role of innovativeness

Studies have shown the mediating effect of innovativeness on the relationship between individuals' perception and outcomes (Syed *et al.*, 2020). Jin *et al.* (2016) have shown that innovative consumers focus on the prestige and symbolic aspects (e.g., social status) of fine dining restaurants. Viewers of a gastronomy livestream can participate in a fully immersive experience with the latest gamified marketing, allowing for the dissemination of detailed expert information about the value of ingredients, food preparation, and nutrition. Thus, once viewers of gastronomy livestreaming identify the values associated with ingredients, cooking, smell, and taste, they are likely to regard themselves as the pioneers in understanding a type of food or a dining establishment. This leads to consumer perception of even relatively high prices as reasonable and cost-effective.

Drawing from the abovementioned, innovativeness (as the organism in the S-O-R model) is an important mechanism for further explaining the relationship between viewers' perceptions (i.e., gamification, perceived professionalism, and telepresence) and their impulsive consumption. Thus, we hypothesize:

H8. Gamification has positive impacts on impulsive consumption through (a) social innovativeness and (b) hedonic innovativeness.

H9. Perceived professionalism has positive impacts on impulsive consumption through (a) social innovativeness and (b) hedonic innovativeness.

H10. Telepresence has positive impacts on impulsive consumption through (a) social innovativeness and (b) hedonic innovativeness.

Drawing from the above, this study develops a model with hypotheses on the consequences of gamification, perceived professionalism, and telepresence on innovativeness, which affects impulsive consumption (Figure 1).

[Insert Figure 1 here]

3. Research Instruments and Methods

Table 1 lists the survey items based on prior studies. For contextual evaluation, a pilot was conducted to correct any inappropriate translations. Then, to check for translation bias, a reverse translation was provided by the second and third authors (university professors and practitioners) who are proficient in both English and Chinese (Brislin, 1970). Finally, the Chinese questionnaire was distributed to participants based on purposive sampling (pilot responses not included) through gastronomy livestreaming and a short video app (Shiniu) in China in August 2021. The opening remarks of the questionnaire emphasized the livestreaming context, and they reminded the respondents to review a livestream they watched recently on gastronomy. The app operator established WeChat groups to promote restaurants and fine food to both travelers and residents. These WeChat members regarded themselves as "foodies" who had extensive dining experience. All survey questions were set as mandatory. The final sample had 1093 respondents (Table 2).

[Insert Table 1 here]

[Insert Table 2 here]

4. Data Analysis

This study applied PLS-PM to analyze the causal-predictive of our proposed hypotheses (Chin *et al.*, 2020; Wu *et al.,* 2022) and NCA was used to extend the PLS-PM findings to capture the necessity logic of the results.

4.1 Evaluation of the measurement model

Common method variance was examined in this study and the results did not show any sign of a severe common method variance issue. First, the survey was conducted anonymously. Second, the highest value of inner variance inflation factors (VIFs) was 2.33, which is lower than 3.3 and therefore sufficient (see Kock, 2015). Third, there is no single factor accounting

for 50% of the variance or higher according to Harman's one-factor test (see Podsakoff *et al.*, 2003).

As shown in Table 1, all composite reliability values were higher than 0.7, and this result supports internal consistency. The convergent validity was examined via average variance extracted (AVE), and the results show a satisfactory value (above 0.5). The values for outer loadings were above 0.7 and support indicator reliability.

Subsequently, the discriminant validity assessment used the heterotrait–monotrait (HTMT) ratio of correlations as its criterion (Henseler *et al.*, 2015) rather than Fornell and Larcker's criterion (1981). In particular, the HTMT criterion contrasts the indicator correlations between constructs with the correlations within indicators of the same construct. Henseler *et al.* (2015, p. 129) demonstrated that the Fornell–Larcker criterion is "largely unable to detect a lack of discriminant validity" in PLS-PM. As shown in Table 3, all values were lower than 0.9 (Henseler *et al.*, 2015; Franke and Sarstedt, 2019). This result supports discriminant validity.

[Insert Table 3 here]

4.2 $PLS_{Predict}$ for model assessment

We evaluated the out-of-sample predictive power by following the outline provided by Shmueli *et al.* (2019). The values of Q^2 predict statistic were higher than 0, which supports predictive relevance. Next, we conducted the $PLS_{Predict}$ analysis. Since the skewness values for prediction errors were lower than |1|, we adopted the RMSE values of the indicators of impulsive consumption. The values in the PLS model were lower than the values in the linear model (LM). As shown in Table 4, the $PLS_{Predict}$ was more accurate for the majority of the indicators, hence medium predictive power has been achieved.

[Insert Table 4 here]

4.3 Evaluation of the structural model

When evaluating the structural model, our study did not show any sign of collinearity issues because the highest value of the inner VIFs was 2.326, which is lower than 5 and therefore sufficient (Hair *et al.*, 2019). Interestingly, our findings also showed that all path coefficients were significant (Table 5). Gamification (ß = 0.328 on social innovativeness; ß = 0.161 on

hedonic innovativeness), perceived professionalism (ß = 0.133 on social innovativeness; ß = 0.309 on hedonic innovativeness), and telepresence (ß = 0.186 on social innovativeness; ß = 0.168 on hedonic innovativeness) increase social innovativeness and hedonic innovativeness respectively. Moreover, social innovativeness (ß = 0.268) and hedonic innovativeness (ß = 0.072) positively influence impulsive consumption further.

[Insert Table 5 here]

According to Table 6, social innovativeness and hedonic innovativeness also serve as mediators between gamification, perceived professionalism, telepresence, and impulsive consumption. Innovativeness has a partial mediating effect on impulsive consumption through social innovativeness and hedonic innovativeness. Thus, all hypotheses are supported.

[Insert Table 6 here]

4.4 Results of necessary condition analysis

NCA is an emerging approach for identifying necessary factors critical to achieving target outcomes (Gannon *et al.*, 2019). It is a data analysis method that complements PLS-PM to extend the aim of causal prediction (Richter *et al.*, 2020). By conducting NCA (Liu *et al.*, 2021; Richter *et al.*, 2020), we tested whether gamification, perceived professionalism, and telepresence were necessary conditions for impulsive consumption and innovativeness.

[Insert Table 7 here]

The NCA results of Table 7 show that gamification, social innovativeness, and hedonic innovativeness are necessary conditions for impulsive consumption ($d \geq 0.1$; $p < 0.05$). However, the necessary condition sizes of perceived professionalism and telepresence are small (< 0.1). Thus, the necessity hypotheses of both perceived professionalism and telepresence are not supported. That is, perceived professionalism and telepresence should be success factors for impulsive consumption, but they are not necessary conditions. Furthermore, gamification, perceived professionalism, and telepresence are not necessary conditions for either social innovativeness or hedonic innovativeness.

5. Discussion

5.1 Conclusions

This study shows that gastronomy livestreaming is influential in shaping viewers' purchase decisions and promoting food-motivated destinations. These effects are distinct from those of binge-viewing livestreaming for pleasure. This study examines the effects of gamification, perceived professionalism, and telepresence on impulsive consumption among viewers of gastronomy livestreaming. It establishes an S-O-R model, which includes the attributes of livestreaming as stimuli (i.e., gamification, perceived professionalism, and telepresence), perceived innovativeness as an organism, and impulsive consumption as the response. The results show that the gamification, perceived professionalism, and telepresence of gastronomy livestreaming positively influence viewers' impulsive consumption. These findings are consistent with studies by Badgaiyan and Verma (2014), de Kervenoael *et al.* (2009), and Setyani *et al. (*2019). First, a gamified marketing process can significantly enhance the livestream viewers' impulse buying. Second, perceived professionalism is another significant factor in viewers' impulse buying. The availability of detailed expositions of food or restaurants on livestreaming platforms is important for viewers, and is a key predictor of impulsive consumption intentions. Third, viewers' immersive telepresence experience through gastronomy livestreaming is important for making unplanned purchasing decisions. Based on the values of f^2 and path coefficients, this study identifies telepresence as a larger factor than gamification and perceived professionalism in influencing impulsive consumption. The NCA results show that gamification is the only attribute of gastronomy livestreaming that is a necessary condition for impulse purchases. These results indicate that gamification is the key concept that represents both necessary and sufficient conditions for impulsive buying.

This study also shows that both social and hedonic innovativeness arise when viewers enjoy gamified components of gastronomy livestreaming and perceive a high level of

professionalism and telepresence from gastronomy streamers. In other words, viewers who participate in gamified tasks through gastronomy livestreaming can be regarded as trend innovators. When viewers are interested in receiving gastronomy information through livestreaming, professional streamers can influence them to perceive innovativeness. The use of interactive and fully immersive livestreaming features also is critical to the experience of innovativeness.

In line with previous findings (see Chen and Wang, 2016; Dholakia, 2000), this study shows that innovativeness influences viewers' impulsive consumption. Trend innovators are more likely to deliberate less and simply spend more money on gastronomy livestreaming platforms. In addition, the perceived social and hedonic innovativeness mediate the relationships between attributes of gastronomy livestreaming (i.e., gamification, perceived professionalism, and telepresence) and impulsive consumption. The NCA findings also show that social innovativeness and hedonic innovativeness are the necessary conditions for livestreaming impulse purchases. These results show that in addition to gamification, social innovativeness and hedonic innovativeness are also key concepts that represent a necessary and sufficient condition for impulsive buying.

5.2 Theoretical contributions

First, this research serves as a response to the call for more examination of the application of livestreaming in hospitality studies (Hoeber *et al.*, 2016). While previous studies have examined perceived values and motivation for adopting livestreaming, recent studies have pointed out that the stimuli that contribute to these values have not been further explored (Fei *et al.*, 2021). This study identified and analyzed both internal factors (perceived professionalism and telepresence) and an external factor (gamification) of gastronomy livestreaming. Few studies have analyzed these factors of gastronomy livestreaming. The results show that all three factors affect impulsive consumption. Incorporating these livestreaming attributes into the analysis generates a more extensive view, and future research is suggested to verify the findings of this study.

Second, environmental stimuli have been found to influence consumers' emotional responses, leading to positive behavioral intentions (Kolar and Čater, 2018). However, the findings of previous studies have been contradictory about the effects of stimulation in the shopping experience (Ding and Lin, 2012). Negative or non-existent effects of stimulation on shopping behavior also were identified (Kaltcheva and Weitz, 2006). Addressing these mixed results, a key argument of our study confirms that the attributes of gastronomy livestreaming have transformed gamified marketing, gastronomic knowledge and skill, and immersive experience into discursive tools for stimulating impulsive consumption. This study examines the psychological processes associated with the stimuli of gastronomy livestreaming, and our findings show that the gastronomy industry can employ livestreaming, an innovative platform, to appeal to viewers in the digital era.

Third, this study extends our understanding of the stimulating effects of gastronomy livestreaming on viewer behavior by considering the role of innovativeness. Few studies have included innovativeness among the drivers of impulsive consumption. Based on the results of the path model, this study explores how the attributes of gastronomy livestreaming (the stimulus stage) affect impulsive consumption (the response stage) through self-evaluative constructs: social and hedonic innovativeness (the organism stage) among viewers. This study identified innovativeness as an important antecedent of impulsive consumption. This research confirms that using innovativeness in gastronomy livestreaming is more likely to compel viewers to buy products and services impulsively—especially when they are excited by gamification, have access to professional streamers who share valid information, and experience quality telepresence. This finding illustrates how the gastronomy industry can achieve competitive advantages through innovative technologies, such as gamification and immersive display, to connect with innovative viewers and prompt them to conduct impulsive buying behaviors. By exploring the relationship between stimulating factors (impulsive buying

intentions) and the intermediary evaluative constructs (innovativeness in livestreaming contexts), these results can better explain viewers' impulsive purchasing behavior in the context of gastronomy livestreaming.

5.3 Practical implications

Prior research has provided an in-depth understanding of the attributes of gastronomy livestreaming in China. While the gastronomy industry has seen the potential business value of livestreaming, it could be further extrapolated to practices in other sectors, such as hospitality and tourism. The current study provides practical suggestions for managers in the wider gastronomy industry about how livestreaming can stimulate impulsive consumption.

First, the results advise the gastronomy industry to stimulate impulsive consumption by incorporating gamified designs, professional streamers, and telepresence broadcasting during promotions. For instance, restaurant managers should use gamified incentives (e.g., red pockets, coupons, points, and discount codes) during livestreaming as a promotion strategy. Such strategies not only encourage viewers to participate in the gastronomy streaming; they also influence viewers' decisions to buy immediately. In addition, it is worth inviting culinary professionals (i.e., celebrity chefs) or key opinion leaders involved in gastronomy livestreaming. Their professional appearance and expert dissemination of gastronomy information could convince fans, followers, viewers, and customers to consume impulsively. This study also emphasizes the role of immersive photography (i.e., photography with a 360° horizontal shooting angle) of the food along with the restaurant ambiance and music as a background. This will influence viewers to immerse themselves into the gastronomy experience, also encouraging impulsive consumption (i.e., real-time online dining reservation or food purchase).

Second, livestreaming technology helps viewers to integrate stimulating features into their self-evaluations of innovativeness because it shapes the way viewers engage with food. Viewers can ascribe innovativeness to livestreaming marketing, which transfers to the food or

the establishment. The findings of this study draw the attention of managers in the gastronomy industry to the alignment between advanced marketing solutions and viewers' innovativeness. In other words, if a viewer perceives innovativeness, they are likely to be intrigued by gastronomy livestreaming and may feel more connected to the establishment and more motivated to purchase. Thus, this research reveals that it is shortsighted to ask gastronomy livestreaming platforms to add new stimulating components but neglect creative or differentiated features. For example, it would be beneficial to allow employees to be creative and innovative at work in the tourism and hospitality industry (Styvén *et al*., 2022). Therefore, in addition to focusing on gamification, perceived professionalism, and telepresence, managers in the gastronomy industry should enhance novel aspects of these considerations to stimulate viewers. This could be achieved through unique game tasks, top-level streamers, a professional team, and novel video perspectives and techniques.

5.4 Limitations and future research

This research has several limitations that can be further explored in the near future. First, the survey took place in China. We suggest validating the model in developing economies (e.g., Malaysia, Thailand, etc.) and across Western cultures. Such comparisons could lead to interesting findings. For instance, the importance of some gastronomy livestreaming features might diminish in other countries. Second, the effects of COVID-19 on gastronomy livestreaming consumption can be further explored (Dedeoglu *et al.*, 2021). In addition, this study collected data in a cross-sectional way. Future studies can also collect data at different points in time using a longitudinal approach to further explore the cause-effect relationship.

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Table 1: Measurement and Operationalization

Construct	Items	Loading	Composite Reliability	AVE
Gamification Scale: 1 (strongly disagree) to 7 (strongly agree) Sources: (Feng *et al.*, 2018; Zhang *et al.*, 2020)	*To what extent you have the following feelings on gastronomy livestreaming?* 1. The gamification rewards (e.g., energy value, badges, points) of gastronomy livestreaming makes me feel more likely to do actions to obtain them. 2. I am motivated to watch gastronomy livestreaming because the game components (e.g., leaderboards, bullet-screen comments, sending gift) involves me in an enjoyable process. 3. The gamification components of gastronomy livestreaming makes me feel more engaged. 4. The gastronomy livestreaming provides rewards (e.g., red pocket and coupon, points) according to specified task behaviors, so as to encourage consumers' participation.	 0.784 0.787 0.784 0.737	0.856	0.598
Perceived professionalism Scale: 1 (strongly disagree) to 7 (strongly agree) Sources: (Ohanian, 1990)	*To what extent you have the following feelings on gastronomy livestreaming?* 1. I think the live streamer(s) can provide a high-quality explanation on gastronomy. 2. I think the live streamer(s) can provide a professional explanation on gastronomy. 3. I think the gastronomy live streamer(s) has rich experiences on the recommended cuisine or restaurants. 4. I think the live streamer(s) has rich gastronomy knowledge. 5. I think the gastronomy live streamer(s) has professional skills.	 0.780 0.813 0.786 0.811 0.771	0.894	0.628
Telepresence Scale: 1 (strongly disagree) to 7 (strongly agree) Sources: (Lee *et al.*, 2020; Ou *et al.*, 2014)	*To what extent you have the following feelings on gastronomy livestreaming?* 1. When watching gastronomy livestreaming, I felt my mind was inside the world created by the streamer(s). 2. When watching gastronomy livestreaming, I felt that I was immersed in the world created by the streamer(s). 3. This gastronomy livestreaming-generated world seemed to me to be "somewhere I visited (e.g., fine dining restaurants)", rather than "something I saw". 4. I felt I was more in the "real world" than the "computer world" when I was watching gastronomy livestreaming shopping. 5. When watching livestreaming, I think I have a real gastronomy experience.	 0.792 0.819 0.769 0.787 0.792	0.894	0.627
Social innovativeness Scale: 1 (strongly disagree) to 7 (strongly agree) Sources: (Vandecasteele and Geuens, 2010)	*To what extent do you agree with the following statement?* 1. I like to try new things that distinguishes me from others who do not experience this new service. 2. I prefer to try new things with which I can present myself to my friends and neighbors. 3. I like to outdo others, and I prefer to do this by trying new things which my friends do not have. 4. I deliberately try novelties that are visible to others and which command respect from others.	 0.733 0.759 0.804 0.746	0.846	0.579

Hedonic innovativeness Scale: 1 (strongly disagree) to 7 (strongly agree) Sources: (Vandecasteele and Geuens, 2010)	*To what extent do you agree with the following statement?* 1. It gives me a good feeling to acquire new things. 2. Innovations make my life exciting and stimulating. 3. Acquiring an innovation makes me happier. 4. The discovery of novelties makes me playful and cheerful.	 0.798 0.814 0.816 0.764	0.875	0.637
Impulsive consumption Scale: 1 (strongly disagree) to 7 (strongly agree) Sources: (Rook and Fisher, 1995; Zhang *et al.*, 2020)	*Based on your experiences on gastronomy livestreaming, to what extent do you agree with the following statement?* 1. When I watch gastronomy livestreaming, I have the urge to purchase items other than or in addition to my specific dining goal. 2. I have a desire to purchase itmes that did not pertain to my specific dining goal when I watch gastronomy livestreaming. 3. I have the inclination to purchase items outside my specific dining goal when watching gastronomy livestreaming. 4. When I watch gastronomy livestreaming, "I see it, I buy it" describes me. 5. When I watch gastronomy livestreaming, "Buy now, think about it later" describes me.	 0.764 0.780 0.817 0.775 0.773	0.887	0.591

Table 2: Respondent Profile

Measure	Item	Frequency	Percentage
Gender	Male	429	39.25%
	Female	664	60.75%
Age	< 18	30	2.74%
	18–25	275	25.16%
	26–30	308	28.18%
	31–40	336	30.74%
	41–50	82	7.50%
	51–60	54	4.94%
	> 60	8	0.73%
Education	Junior high school or below	42	3.84%
	Senior high	116	10.61%
	University	865	79.14%
	Master's degree or above	70	6.40%
Working experience	1–5 years	470	43.00%
	6–10 years	362	33.12%
	11–15 years	123	11.25%
	16 + years	138	12.63%

Table 3: Heterotrait-monotrait ratio of correlations (HTMT) and Fornell-Larcker Criterion

	Gamification	Perceived professionalism	Telepresence	Impulsive consumption	Hedonic innovativeness	Social innovativeness
Gamification	0.773	**0.810**	**0.836**	**0.714**	**0.604**	**0.705**
Perceived professionalism	0.660	0.793	**0.791**	**0.646**	**0.635**	**0.592**
Telepresence	0.682	0.675	0.792	**0.695**	**0.582**	**0.621**
Impulsive consumption	0.579	0.549	0.591	0.782	**0.585**	**0.713**
Hedonic innovativeness	0.480	0.529	0.486	0.484	0.798	**0.758**
Social innovativeness	0.543	0.475	0.500	0.571	0.592	0.761

Note: The HTMT result is highlighted in bold and falls above the diagonal value while the below result belongs to Fornell-Larcker Criterion.

Table 4: PLSpredict assessment on manifest variables

	Q^2predict	PLS-SEM RMSE	LM RMSE	PLS-SEM – LM RMSE
Impulsive consumption1	0.227	1.168	1.166	0.002
Impulsive consumption2	0.260	1.187	1.194	-0.007
Impulsive consumption3	0.250	1.242	1.252	-0.010
Impulsive consumption4	0.292	1.251	1.256	-0.005
Impulsive consumption5	0.239	1.442	1.428	0.014

Note:

i. RMSE: Root mean squared error; MAE: Mean absolute error; PLS: Partial least squares path model.

ii. LM: Linear regression model. k=7 subgroups, number of repetitions =10

Table 5: Structural Model results - Effects on Dependent Variables.

Effect	Direct effect	*p* value	Bootstrap confidence interval		Explained Variance (%)	f^2
Social innovativeness (R^2=0.334, Q^2predict=0.328)						
Gamification (a_1) H4a (+)	0.328	0.000	0.263	0.402	17.81	0.075
Perceived professionalism (a_2) H5a (+)	0.133	0.002	0.061	0.207	6.32	0.012
Telepresence (a_3) H6a (+)	0.186	0.000	0.107	0.261	9.30	0.023
Hedonic innovativeness (R^2=0.322, Q^2predict=0.316)						
Gamification (a_4) H4b (+)	0.161	0.000	0.095	0.226	7.73	0.018
Perceived professionalism (a_5) H5b (+)	0.309	0.000	0.229	0.386	16.35	0.066
Telepresence (a_6) H6b (+)	0.168	0.000	0.101	0.239	8.16	0.019
Impulsive consumption (R^2=0.484, Q^2predict=0.416)						
Gamification (c_1')	0.163	0.000	0.106	0.221	9.44	0.022
Perceived professionalism (c_2')	0.121	0.002	0.053	0.193	7.19	0.013
Telepresence (c_3')	0.229	0.000	0.166	0.297	13.53	0.044
Social innovativeness (b_1) H7a (+)	0.268	0.000	0.203	0.325	15.30	0.077
Hedonic innovativeness (b_2) H7b (+)	0.072	0.025	0.012	0.131	3.48	0.006

Note: Bootstrapping based on n = 10,000 bootstrap samples. Effects from the control variable are assessed by applying a two-tailed test (PCI 95%).

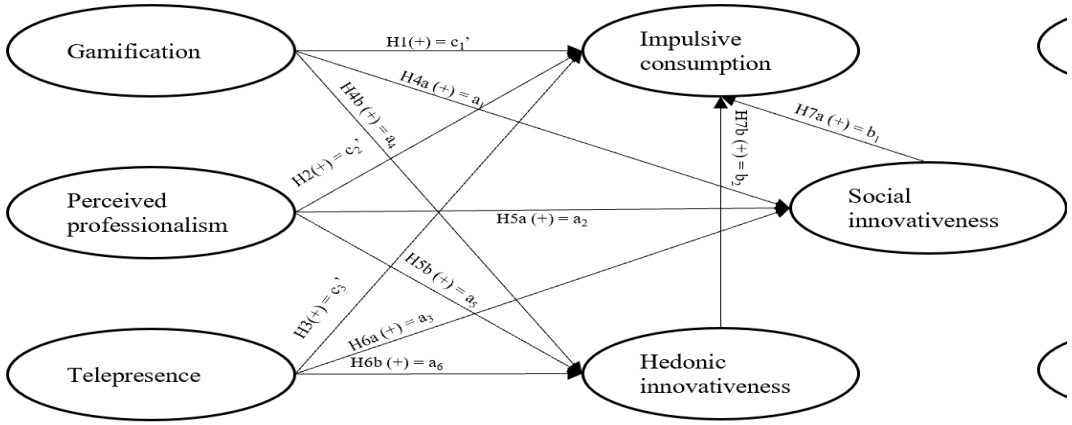
Table 6: Summary of mediating effect test

Total effect on impulsive consumption			Direct effects on impulsive consumption			Indirect effects on impulsive consumption					
	Path	*p* value		Path	*p* value		Point estimate	Confidence interval		Sig.	VAF
Gamification (c_1)	0.263	0.000	H1(+): Gamification (c_1')	0.163	0.000	H8a (+): a_1b_1 (via Social innovativeness)	0.088	0.062	0.118	Yes	33.46%
Perceived professionalism (c_2)	0.179	0.000	H2(+): Perceived professionalism (c_2')	0.121	0.002	H8b (+): a_4b_2 (via Hedonic innovativeness)	0.012	0.002	0.023	Yes	4.56%
Telepresence (c_3)	0.291	0.000	H3(+): Telepresence (c_3')	0.229	0.000	Total = a_1b_1+ a_4b_2	0.100	0.072	0.131	Yes	38.02%
						H9a (+): a_2b_1 (via Social innovativeness)	0.036	0.016	0.056	Yes	20.11%
						H9b (+): a_5b_2 (via Hedonic innovativeness)	0.022	0.003	0.045	Yes	12.29%
						Total = a_2b_1+ a_5b_2	0.058	0.032	0.087	Yes	32.40%
						H10a (+): a_3b_1 (via Social innovativeness)	0.050	0.026	0.073	Yes	17.18%
						H10b (+): a_6b_1 (via Social innovativeness)	0.012	0.002	0.024	Yes	4.12%
						Total = a_3b_1+ a_6b_1	0.062	0.038	0.090	Yes	21.31%

Note: Bootstrapping based on n = 10,000 bootstrap samples. Effects from the control variable are assessed by applying a two-tailed test (PCI 95%).

Table 7: NCA effect sizes

Construct	Impulsive consumption		Construct	Social innovativeness		Hedonic innovativeness	
	CE-FDH	p-value		CE-FDH	p-value	CE-FDH	p-value
Gamification	0.109	0.000	Gamification	0.079	0.001	0.063	0.000
Perceived Professionalism	0.094	0.001	Perceived Professionalism	0.066	0.051	0.063	0.000
Telepresence	0.090	0.000	Telepresence	0.034	0.416	0.030	0.111
Social innovativeness	0.218	0.000					
Hedonic innovativeness	0.310	0.000					



Research model (Model 1)

H8a (+): Gamification -> Social innovativeness-> Impulsive consumption=a_1b_1
H8b (+): Gamification -> Hedonic innovativeness-> Impulsive consumption=a_4b_2
H9a (+): Perceived professionalism -> Social innovativeness-> Impulsive consumption=a_2b_1
H9b (+): Perceived professionalism -> Hedonic innovativeness-> Impulsive consumption=a_5b_2
H10a (+): Telepresence -> Social innovativeness-> Impulsive consumption=a_3b_1
H10b (+): Telepresence -> Hedonic innovativeness-> Impulsive consumption=a_6b_2

Figure 2 Research model and competing models