

The Viewer Value Co-Creation Process on Sports Live Streaming Platforms

Abstract

Purpose- The Sports Live Streaming Platforms (SLSPs) have taken centre stage in broadcasting sporting events. This study adopts the value creation sphere (VCS) model and the service dominant logic (SDL) to unpack the value co-creation process on SLSPs.

Design/methodology/approach — A case study with one of the most representative SLSPs in China, involving the netnographic approach and in-depth interviews, was conducted.

Findings — This study redefines the value co-creation spheres in the context of SLSPs and identifies four actors who contribute to viewers' value perceptions. The findings show that viewers' values can be co-created individually and collectively with other actors in both the customer sphere and the joint sphere.

Originality/value — This study extends the theoretical boundary of value co-creation into the context of SLSPs. Our findings help SLSPs managers and decision makers understand the value co-creation process to gain competitive advantages and enhance the sustainability of their services.

Key words Value co-creation, sport live streaming platforms, value creation sphere model, service dominant logic

Paper type Research paper

1. Introduction

With the rapid improvement of the internet and mobile technologies, social live streaming services (SLSSs), a new type of social media, have emerged and grown rapidly all over the world in the last decade (Wohn and Freeman, 2020). In western countries, Twitch, which is a gameplay-based live streaming platform, is the most popular live streaming platform. It has over 8 million unique streamers who go live every month, and 31 million average daily visitors who watch and interact with the live streams (Twitch, 2023). In China, there is a total of 716 million live streaming platform users who actively watch and use live streaming apps for different purposes, such as using the TikTok live streaming service for socialising, shopping, education, and so forth (CNNIC, 2022). In the unprecedented times of the COVID-19 crisis, the lockdowns and social distancing measures across the world devastated the sports industry, threatening in particular sports customers' attendance at and engagement with sports events. Due to the outbreak of COVID-19, fans are spending even more time online. The sports Live Streaming Platforms (SLSPs), which are a topic-specific SLSS, have taken centre stage in broadcasting sporting events, with the aim of innovating the viewing experience and increasing connectivity with sports consumers.

1 Different to general SLSSs, in which diverse videos such as singing, storytelling, and dancing are generated in
2 real-time by streamers, SLSPs (e.g., PPTV Sports, which broadcasts the English Premier league, and Tencent
3 sport, which broadcasts NBA) rely on existing sporting events content (Lu et al., 2018; Qian et al., 2020; Kim and
4 Kim, 2020). Liu et al. (2022) identified that the operating mechanism of SLSPs includes four steps, which are
5 content production, content authorisation, content reprocessing, and content diffusion. The players contribute with
6 their performance in the content production step, platforms acquire sports events broadcasting rights and then
7 broadcast the sports events contents, and the streamers add value when reproducing the sports events. Therefore,
8 the interactions on SLSPs involve different actors providing value propositions and contributing to the viewers'
9 viewing experiences. This is in contrast to general SLSSs, on which the only relationship that exists is that between
10 streamers and viewers.

11 Scholars have endeavoured to explore the sports customers' usage of SLSPs. Kim and Kim (2020)
12 examined the influence of four types of gratification expectations (cognitive gratification, personal integration,
13 social integration, and tension release) on users' flow states and satisfaction with SLSPs. Qian (2021) confirmed
14 that viewers' continuous spectating intentions are positively impacted by virtual interactions when watching the
15 National Football League (NFL) live streaming on Twitch. Liu et al. (2022) proved that the perceived value
16 perceptions of viewers can be acquired from interacting with different actors, which can influence their
17 satisfaction and further impact the viewers' engagement behaviour. Although previous studies have started to
18 explain the engagement behaviour on SLSPs (Liu et al., 2022), there is still a lack of focus on the value co-creation
19 process on SLSPs. However, the understanding of the value co-creation is important for offering insights into and
20 uncovering strategies for engaging with sport customers on SLSPs.

21 Value co-creation is being increasingly discussed as part of business strategy in both the marketing and
22 operations management literature, with an emphasis on the active roles of consumers. According to the view of
23 Prahalad and Ramaswamy (2004), co-creating customer experience is the basis of value. The creation process of
24 consumer experience relies on the process of both consumers and firms creating value jointly. Consumers play a
25 central role in creating unique and personalised experiences together with enterprises. SDL further emphasises
26 the decisive role of customer in value co-creation and points out that the service value is co-created and determined
27 by the beneficiary through integrating the value proposition of the service providers with their own resources
28 (competencies, knowledge, abilities, and skills) (Akaka et al., 2013; Lusch and Nambisan, 2015). According to
29 SDL, firstly, the customers can either play the role of value provider or value beneficiary in a service system
30 (Pongsakornrungrasit and Schroeder, 2011). Second, the value co-creation is not only reliant on the direct activities

1 of any one exchange or a dyad of service systems, but involves a wider network that includes both direct and
2 indirect interactions in the “triadic structure or the meso level (midrange structures such as the entire, but specific,
3 value co-creation system) and the macro level (entire economy or society)” (Vargo and Lusch, 2016, p.17). Third,
4 the value provider can only provide value propositions, which are the potential benefits offered to customers. The
5 customer (beneficiary) is the judge of the benefits, because they evaluate and determine the perceived value (value
6 outcomes) based on how they interact with providers’ offerings (Vargo and Lusch, 2004; Vargo and Lusch, 2008;
7 Prahalad Ramaswamy, 2004). The value is realized through a process of consumption where customers interact
8 with service providers through using their products and services. Value is continuously and dynamically formed
9 along with consumers’ interactions with multiple actors in the system networks. Customers evaluate and
10 determine the service’ value proposition based on the specificity of their usage and in the service context (Vargo
11 and Lusch, 2004).

12 The existing literature predominantly emphasises how value-creation processes are organised between
13 customers, or between firms and customers (e.g., Schau et al., 2009; Arnould et al., 2009; Uhrich, 2014). For
14 example, Grönroos and Voima (2013) proposed a value creation sphere (VCS) model and tried to offer a clear
15 conceptualization of how service providers contribute to the customer’s experiences and, consequently, to
16 perceptions of value-in-use. They framed the firm-customers value creation as a process composed of three
17 spheres (provider sphere, joint sphere, and customer sphere) and highlighted the impact of direct and indirect
18 forms of interaction in customers’ creating value individually and collectively. However, in the service system of
19 the SLSPs, the viewing experience cannot be solely produced through the interaction between viewers and the
20 SLSP. The viewers evaluate the effectiveness of the services through evaluating the value proposition of multiple
21 service providers, e.g., players’ performance, streamers’ interactions, other viewers’ passion, and platforms’
22 information systems. Therefore, the service value perceived by viewers is co-created through a process where the
23 viewers interact with the value propositions of multiple actors, e.g., platform, streamers, players, and other
24 viewers. Accordingly, the viewers’ value co-creation process in the SLSPs system needs to be studied at the meso-
25 level (Horbel et al., 2018).

26 The current study aims to explore how viewers engage with multiple actors in co-creating the value of
27 the viewing experience on SLSPs. The following research questions underpin this study:

- 28 (1) How do viewers interact with different actors?
29 (2) What values are co-created by viewers through interacting with different actors?

1 This study is organised as follows. In the next section, a literature review on the sports live streaming
2 services, value co-creation process, and perceived value in sports is presented to explain the fundamentals of the
3 research theme and background. Then, the research method section describes the methodology of this study. After
4 this, the findings and discussion sections of the study show all insights identified in the research and discuss how
5 these insights contribute to the existing body of knowledge. Finally, the limitations of the study are presented
6 alongside recommendations for future research.

7 **2. Literature Review**

8 *2.1 Sports live streaming services*

9 In recent years, due to the popularity of the applications of SLSSs, scholars from marketing and operations
10 management have unfolded the usage motivation and information behaviour mechanisms of SLSSs (Lu et al.,
11 2018; Scheibe et al., 2016; Lin et al., 2021; Hilvert-Bruce et al., 2018). The SSLs are defined as a primarily
12 synchronous and simultaneous live streaming and social media where users can broadcast their own live
13 programmes and the viewers can interact with the streamer through sending gifts such as points, badges, or money
14 (Scheibe et al., 2016). Viewers and streamers enjoy a shared live experience by engaging remotely with each other
15 (Hamilton et al., 2016). There are topic-specific SLSSs (e.g., Twitch for gaming) and general (without any
16 thematic limitation) according to their content provision (Friedländer, 2017).

17 SLSPs are a topic-specific SLSS that focus on providing viewers with live streams of sporting events
18 and other sport-related content. Table 1 highlights the distinctive features of SLSPs in comparison to SLSSs and
19 TV sports livestreaming. Firstly, in the case of the traditional sports events broadcasting industry, TV broadcasts
20 are the main channel for watching sports games off-site (Turner, 2007). By viewing the live TV broadcasts, sports
21 fans can only passively accept the interpretation of sports competitions from the commentator and use a second
22 screen for social media (e.g., Twitter, Facebook) to interact with other viewers (Lu and Chen, 2021). However,
23 SLSPs enable viewers to communicate with streamers and other viewers by sending real-time messages and
24 virtual gifts while watching the livestreams of sports events (Chen and Lin, 2018; Kim and Kim, 2020; Geng et
25 al., 2020). Meanwhile, SLSPs offer sports viewers with a series of new functions such as 360-degree viewing,
26 multi-screen display, and a virtual reality environment to create an intensely immersive viewing experience (Liu,
27 Tan, and Pawar, 2022). Second, on SLSPs, there are many streamers broadcasting the same sporting event at the
28 same time. SLSPs viewers can choose their favourite streamers' rooms to share and affirm their devotion to their
29 sports or teams with the streamers and other viewers in a streamer-hosted community (Liu et al., 2022). The
30 viewers can also interact with the streamers and other viewers by commentating on matches, building

relationships, answering questions, re-processing content, and maintaining the live interactive environment (Liu et al., 2022). Thirdly, with the general SLSSs, and video game-specific SLSSs, streamers broadcast their own content (e.g., their daily life or talents) in real-time (Scheibe et al., 2016). However, SLSPs rely on sporting events, which are not created by the streamers. Streamers are thus crucial in the reprocessing of the sport event content through using their facial expression, knowledge of sports, and framing skills (Liu et al., 2022; Parker and Fink, 2008). Therefore, SLSPs need to bid for the broadcasting rights of the sports events from sporting organizations (clubs, leagues, national and international federations, and major event providers). Streamers and viewers will be attracted to use the sports livestreaming only if it owns the copyright of the sport event.

Table 1 The features of SLSPs.

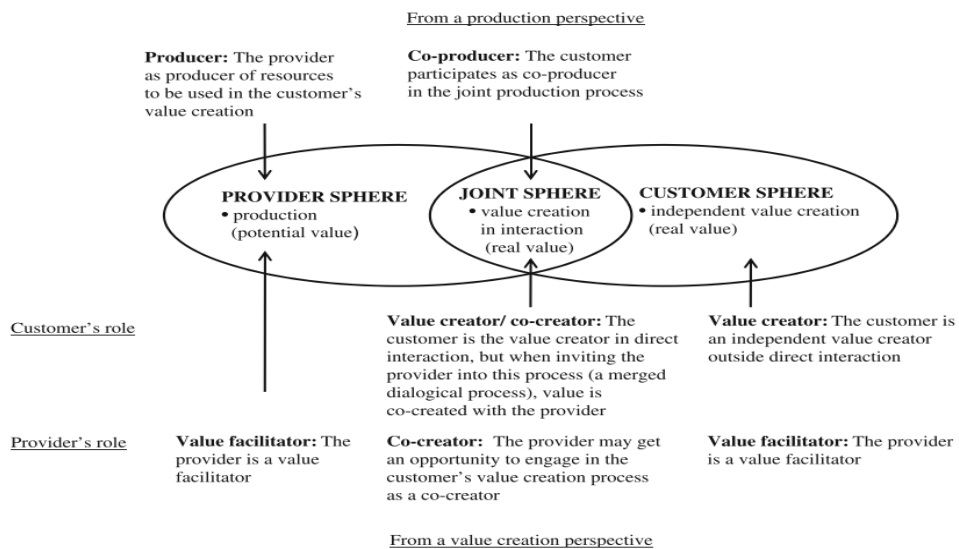
	Sports TV livestreaming	General SLSSs	Topic-specific SLSSs	
			Video games	SLSPs
Spectatorship	Passive viewing/ second screen interaction	Positive interaction	Positive interaction	Positive interaction
Community	N/A	Streamer-hosted social group	Streamer-hosted social group	Streamer-hosted social group
Content provider	Sports organizations	Streamers	Streamers	Event organizations

Previous studies have tried to examine the viewers' engagement behaviour as a vehicle for contributing to the viewing experience. For example, Kim and Kim (2020) conducted the first study on sporting event live streams on SLSSs based on uses and gratification theory. Through collecting data from 231 sport SLSSs users, they found that personal integration, social integration, the experience of relaxation and entertainment, and affective gratification positively influence the users' flow experiences (holistic immersion). Liu et al. (2022) used viewers' behavioural big data, with machine learning techniques and structural equation modelling (SEM), to examine the influence of viewer value perception on gifting behaviour through the mediation effect of satisfaction. This study brings insights into the value co-creation process on SLSPs. In order to further advance the value co-creation process and the use of emerging social media in the promotion of sports entertainment, this study offers an understanding of how viewers interact with multiple actors to co-create value when viewing sports events on SLSPs.

2.2 Viewer value co-creation process

Value co-creation is a process in which consumers play an active role and co-create value with the firm (Prahalad and Ramaswamy, 2004). The customer is no longer seen as the end of the value chain, but as a value co-creator, signaling a change from a product dominant logic perspective to SDL (Vargo and Lusch, 2008). More specifically, the customers can act as co-producers/co-providers who participate in specific activities in the production chain/service networks and help the firms to produce and provide their goods/services more efficiently (Prahalad

1 and Ramaswamy, 2004; Vargo and Lusch 2004; Voorberg et al., 2015; Oyner and Korelina, 2016). The customers’
 2 provision can be inputs to the firms through interactive activities (Alexander and Jaakkola, 2015; Zhan et al.,
 3 2020). For example, customers can post user-generated contents in the companies’ online social communities to
 4 share information, solve problems, share knowledge relating to products and services, as well as interact with
 5 each other, thereby augmenting the firm’s offerings and co-creating the service experience for other online
 6 customers (Alexander and Jaakkola, 2015; Chen et al., 2018; Kim et al., 2019). In addition, the customers can add
 7 value to a company’s offers for themselves (Vargo et al., 2008). Customers evaluate and decide a service providers’
 8 value propositions based on how they use (e.g., behave, interact, interpret, experience) the service and what social
 9 context they are involved in (Vargo and Lusch 2004, Prahalad and Ramaswamy, 2004; Sandström et al., 2008;
 10 Vargo and Lusch, 2016:17). In line with SDL, Grönroos and Voima (2013) point out that “value creation is the
 11 customer’s creation of value-in-use during usage, where value is socially constructed through experiences”.
 12 Grönroos and Voima (2013) framed value co-creation as a process composed of three spheres: (i) provider sphere;
 13 (ii) joint sphere; (iii) customer sphere. We will refer to these three spheres collectively as the value creation sphere
 14 (VCS) model (see Figure 1):



15
 16 **Figure 1 The three sphere of Grönroos & Voima (2013) VCS model.**

17 The provider is the value facilitator who provides potential value propositions. In the joint sphere,
 18 customers create value for themselves through a dialogical process of direct interaction with firms. The firms
 19 could therefore influence the customers’ value creation positively and negatively. In the customer sphere, there is
 20 no direct interaction between service providers and customers. Customers create value through value-in-use
 21 independently, and this value cannot be impacted by the providers. However, as Grönroos and Voima (2013)
 22 emphasise, this value creation is independent from the provider and may be influenced socially by the customer’s

1 social networks and ecosystems (Grönroos and Voima 2013). Therefore, in the customer sphere, the customer's
2 experiences and perception of value-in-use can be divided into individual and collective phases. On the one hand,
3 the customer independently combines their own resources to make individual value creation possible. On the other
4 hand, the customers' collective value is influenced by the customers' network during the value creation process.
5 This process involves other customer-related actors such as family and friends, which are beyond the firm's
6 control.

7 Although Grönroos and Voima (2013) developed three value creation spheres to conceptualise the
8 customer's value co-creation with the firm, it is also useful to extend the dyadic firm-customer value co-creation
9 process to explain the more complex value co-creation networks of SLSPs. First, in the case of SLSPs, various
10 actors such as the players, platforms, streamers, and other viewers, are naturally involved in value co-creation
11 process. Therefore, a 'service ecosystem', which is under SDL, is most suitable for analysis because the main
12 purpose of SLSPs is not to interact directly with the streamers but to link different stakeholders to create an event
13 experience for viewers (Woratschek et al., 2014). 'Service ecosystems' can be interpreted as subsystems of
14 society. It has been suggested that they should be analysed at different levels, namely the intra level (individual
15 actors), micro level (dyadic and triadic structures), the meso level (midrange structures such as the entire, but
16 specific, value co-creation system), and the macro level (entire economy or society) (Chandler and Vargo, 2011;
17 Woratschek et al., 2014). This value co-creation process on SLSPs needs to be studied at the meso level rather
18 than intra level or micro level in order to understand how viewers co-create their viewing experience through
19 interacting with multiple actors in the context of SLSPs (Horbel et al., 2018). Second, the traditional social media
20 platforms, such as Twitter, can directly communicate with customers or users (Singaraju et al., 2016; Abeza et
21 al., 2018), while the SLSPs only provide value proposition indirectly to the viewers. Meanwhile, based on the
22 unique features of SLSPs, the players who are the content providers cannot interact with the viewers directly.
23 However, the viewers' perceived value of watching the sports events is co-created by the team player performance
24 (Horbel et al. (2016). On SLSPs, some of the value providers only existing in the customer sphere because they
25 cannot interact with the viewers directly. Third, the value provider is not limited to the platform or players. Studies
26 on value co-creation in social media show that sports customers can play both the role of value providers and that
27 of value beneficiaries (Pongsakornrunsilp, 2010; Uhrich, 2014). These customers answer questions, post new
28 information, acquire knowledge, and cheer for players together based on their interactions with other viewers
29 within the online fan community (Pongsakornrunsilp and Schroeder, 2011). On SLSPs, viewers consume the
30 service offering (the sports event) based on their direct interactions with streamers and other viewers within their

1 social context (Hou et al., 2019; Kim and Kim, 2020; Liu et al., 2022). Given that sport consumption experiences
2 take place within customers' own social structures, value should therefore be understood as 'value-in-social-
3 context'. The 'value-in-social-context' concept specifically refers to the dependency of individuals' value
4 perceptions on their relative position in society (Evardsson et al., 2011). This perspective is also reflected in SDL
5 value co-creation as "the actions of multiple actors, often unaware of each other, that contribute to each other's
6 wellbeing" (Vargo and Lusch, 2016, p. 8). Therefore, collective value co-creation may also exist in the joint
7 sphere where customers co-create value with other customers.

8 In general, the process of value co-creation in SLSPs involves multiple actors. This is in line with the
9 SDL that value creation involves a more complex relationship and the value is always co-created by multiple
10 actors, including the beneficiary. In addition, the actors only offer value propositions rather than delivering and
11 creating value as the value is decided by customers (Lusch and Vargo, 2006). Based on SDL, the current study
12 aims to adapt the VCS model into a meso level of analysis to explain the viewers' value co-creation process on
13 SLSPs.

14 *2.3 Perceived value in sports context*

15 Value within the service business system can be diverse. According to Kunkel et al. (2017), the customer's
16 perceived value can be classified into four types: economic, emotional, symbolic, and epistemic. Sport marketing
17 studies have paid more attention to discover the sport customers' symbolic value, emotional value, and epistemic
18 value to help understand and engage the sports customers more effectively. Symbolic value, such as team
19 identification, can be explained as an expression of togetherness or distinctiveness of sports customers (Jalonen,
20 2015). Sutton *et al.* (1997) define team identification as 'the fans' personal commitment and emotional
21 involvement with a sports organization' (p, 16). The level of deification with a team can influence the sports
22 spectators' subjective evaluation of team performance and leads to a more positive evaluation of the team's
23 performance (Horbel *et al.*, 2018). Moreover, sports customers can interact with each other on the social media
24 platform and identify with the fan community of their sports brand (Hajli and Hajli, 2013). It is the sense of
25 community among sports fans that impacts the value creation of fans (Muniz and O'Guinn, 2001; Zagnoli and
26 Radicchi, 2010). In addition, sports customers can acquire emotional value from meaningful experiences. In the
27 sports event, for example, the cheering and the stadium atmosphere are fundamental to the sporting event
28 experience (Fyrberg Yngfalk, 2013). Horbel *et al.* (2018) analyse empirically the spectator experience in off-pitch
29 contexts and identified that the spectator experience is determined by team performance, service quality, and
30 atmosphere. Furthermore, the epistemic value is often emphasised by scholars in their studies of online sports

1 communities. Epistemic value is defined as the utility derived from the capacity of a sport team's game to arouse
2 curiosity, provide novelty, and satisfy a desire for knowledge (Kim et al., 2019). The sports customers are able
3 to play roles as either provider (more experienced members) or beneficiary (generally less experienced members)
4 in the community (Pongsakornrunsilp and Schroeder, 2011). When fans work as providers, according to
5 Pongsakornrunsilp and Schroeder (2011), they contribute to the sports fan community as 'creative posters
6 (contributing knowledge, comments, and information), brand warriors (indoctrinating brand traditions to
7 beneficiaries), and moderators (compulsory duties of TIA board members). On the contrary, the less experience
8 fans will be the beneficiary acquire these shared values. Therefore, sports customers could acquire value when
9 watching sports event on-site and online. The existing literature has rarely discovered what value has been co-
10 created by sports customers with other actors when viewing sports events on SLSPs, which are a newly developed
11 form of social media.

12 **3. Methodology**

13 This empirical study explores how customers co-create value with multiple actors. Therefore, a qualitative
14 research approach is more appropriate for improving our knowledge of the value co-creation between customers
15 and other actors on the SLSPs. This research adopts interrogative and observational methods including the
16 netnographic approach and in-depth interviews. In this study, one of the top Chinese sports live streaming
17 platforms, was selected as a case study. This platform has acquired the copyright to broadcast a vast range of
18 competitive sporting events, through live streaming, from sports organisations including the International Table
19 Tennis Federation, Badminton World Federation, World Professional Billiards, and so forth.

20 First, we conducted netnography to observe (1) actors with whom the viewers interact, and (2) what type
21 of interaction the viewers have with these actors on the SLSPs. The research method of netnography can help gain
22 an understanding of social interaction in online communities (Kozinets, 2012). The netnography is based on data
23 gathered from one of the platform's popular streamer's live streams on the final matchday (December 16th 2019,
24 12:40 to 20:40) of the International Table Tennis Federation (ITTF) World Tour Grand Final 2019. In the first
25 step, one of the popular streamers — Xiao Mage — was selected to record the live streams on the final matchday.
26 Xiao Mage joined in this sport live streaming platform in 2016. He has the most followers (316,000 followers)
27 and the most stream views (7 million) out of all table tennis streamers on the platform. During the data collection
28 process, we act as both a participant and a non-participant with the permission of the platform and the streamer.
29 We observed the viewers interacting with different actors when they were watching the live stream, including
30 observing the streamer's verbal content and the viewers' real-time messages. Reflective field notes were taken in

1 the process. The real-time messages and gifting data were recorded automatically by the platform. In total, 16,204
2 real-time messages were recorded.

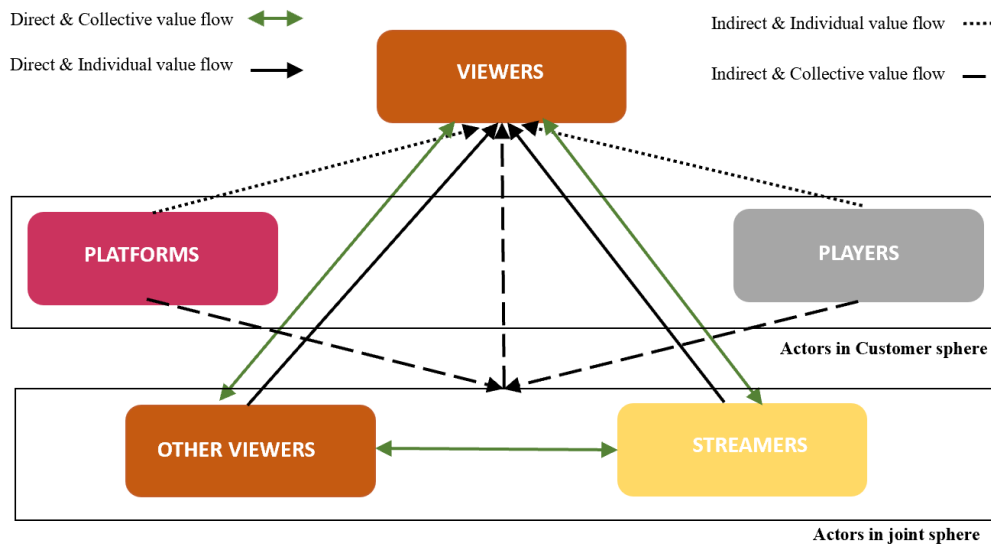
3 Second, semi-structured interviews were conducted in order to understand value co-creation from the
4 viewers' perspective, especially in terms of what value is co-created by the viewers through interacting with the
5 actors. The viewers were selected as interviewees based on two criteria: 1) Self-identifying as a table tennis fan
6 for at least one year; and 2) Using the sport live streaming platform at least once a week. The interview protocols
7 were developed based on the existing literature in the fields of value co-creation and live streaming services
8 (Horbel et al. 2016; Kunkel et al. 2017; Vale and Fernandes, 2018; Pongsakornrungrsilp and Schroeder, 2011).
9 The interview questions have been designed and classified into two warm-up questions and main questions. In
10 the main question section, actors and value proposition, viewer engagement behaviours, and perceived value are
11 the three themes for the questions. As the initial questions were developed in English, it was necessary to translate
12 them from English to simplified Chinese for the interviewees. The translation process described by Kim et al.,
13 2020 is used in this study. First, two bilingual individuals translated the questions into simplified Chinese. Second,
14 another bilingual individual translated the questions back into English. Third, in order to establish the clarity and
15 accuracy of the translated items, three Chinese-English students assessed the discrepancies between the original
16 questions and the translated ones. The next phase is a pilot test, the aim of which is to ensure the coverage and
17 relevance of the questions (Kallio et al., 2016). After the pilot test, the problem of repeated answers caused by the
18 overlap of questions was identified. Therefore, some of the questions were removed so there were fewer but more
19 focused questions. Eventually, two of researchers interviewed each participant online through a WeChat video
20 call. In total, 14 interviews, which ranged in duration from 27 to 67 minutes, were conducted. All of the interviews
21 were recorded digitally and transcribed.

22 **4. Data analysis and Findings**

23 The data pool consisted of field notes taken during the observation period, the real-time messages data, and
24 interview data. A transcription software called Xun Jie text-speech converter was used to transcribe the interview
25 data. However, we proofread all of the transcribed data to ensure the software's accuracy. An analytical software,
26 Nvivo, was used to do analyse the data. Through coding, comparing, and categorising, the overview of the
27 interview data are concluded based on the flowing three aspects: (1) actors with whom the viewers interact; (2)
28 what type of interaction do the viewers have with these actors; (3) what value is co-created by viewers through
29 interacting with these actors (see Appendix 1). According to Grönroos and Voima (2013)'s value creation sphere

1 (VCS) model, we identified how viewers interact with different actors to co-create value individually and
 2 collectively in the joint sphere and customer sphere. Meanwhile, the (see Figure 2 and Table 2).

3 The remainder of this section will present the results by introducing the value co-creation process from
 4 both the joint sphere and the customer sphere. The individual and collective value co-creation phases are not
 5 specific to the customer sphere but can happen in the joint sphere.



6
 7 **Figure 2 Value creation of joint and customer spheres in SLSPs.**

8 **Table 2**
 9 Defining the value co-creation networks in SLSPs.

	Joint sphere (Direct interaction)		Customer sphere (Indirect interaction)	
	Individually	Collectively	Individually	Collectively
Definition	Sports viewers interact with actors directly and co-create value-in-use individually.	Sports viewers interact with actors indirectly, but co-create value-in-context collectively and are impacted by other actors in the social networks and ecosystems.	Sports viewers interact with actors indirectly and viewers co-create value-in-use individually.	Actors interact with sports viewers directly, but sports viewers co-create value-in-context collectively and are impacted by other actors in the social networks and ecosystems.
Actors Example	Viewers-streamers Streamers react to the sports viewers' messages in real-time to address the viewers' questions.	Streamers-viewers Sports viewers send the most expensive gifts to streamers and attract other viewers' admiration for adding to the enjoyment of consumption.	Platform-viewers Sports viewers use 360° and multi-view to watch the game and acquire flow experience and feel as though they are at the sport event stadium.	Platform-viewers The room managers harmonise the language environment of the room and improve the experience of using the platform.
Actors Example	Viewers-viewers Sports viewers cheer for their teams or criticise opponents by interacting with streamers and other viewers through real-time messages.	Viewers-viewers Room managers answer other viewers' questions that are related to sports techniques, strategies, scores, and so on.	Players-viewers Sports viewers watch the players' performances and learn advanced and useful techniques.	Players-viewers Viewers follow other viewers in sending real-time messages to cheer the players on.
Value-in-use	Knowledge acquisition; Social Interaction; Fans induced atmosphere	Sense of community; self-identity	Knowledge acquisition; Flow	Group acceptance; entertainment; service environment

1 4.1 Value co-creation in the joint sphere

2 On SLSPs, the value co-creation in a joint sphere is from the direct interaction viewers and other actors. These
3 actors can directly engage with viewers and influence their value perception. As per to Figure 2, the direct
4 interaction on the SLSPs networks encompasses streamer-to-viewers and viewers-to-viewers value co-creation.

5 4.1.1 Co-create value individually in joint sphere

6 Viewers on SLSPs derive value from interacting with streamers whose expertise and interactivity can contribute
7 to their watching experience. Just like the commentator on traditional sports broadcasts and TV, the duty of the
8 streamer is to commentate on the match, including by introducing the players' backgrounds, the sport's history,
9 the process of the match, and so forth. However, unlike traditional sport TV broadcasts where there are normally
10 two commentators (the host and the guest) working together to commentate on the match, there is only a single
11 streamer in the live streaming room (*Li et al.*, 2018). The streamers place a higher value on playing both the role
12 of the host and the guest to share professional knowledge and useful information with viewers. The level of
13 expertise of the streamers is important. This point is emphasised by a student from Beijing Sport University: "I
14 like to choose a streamer who is a former professional player because their comments and opinions are more
15 useful than those of other streamers." Similarly, another interviewee stated: "the streamers with a professional
16 background can recognise good technique and analyse the strategies the players use, so I can learn a lot when I
17 am watching." Therefore, viewers can acquire epistemic value (perceived knowledge or expertise) by listening to
18 the streamer's commentary.

19 The interactivity of the streamers is a crucial contribution to the experience of SLSPs viewers. Viewers
20 can derive emotional value (entertainment) through participating in different activities with the streamers,
21 including real-time messaging, gifting, quizzing, voting, and drawing. Streamers interact with viewers through
22 vocal communication and real-time messages. They react to the viewers' messages in real-time to show they care
23 about the audience's expectations of interaction. The interactive communication makes the viewers feel that the
24 streamer is approachable. Meanwhile, the viewers are free to send their thoughts and questions in real-time
25 messages. For example, one question posted by a viewer No. 3445626 enquired about the streamers' thoughts as
26 follows: "Streamer, which player do you think will win?" (No. 10426969, 2019-12-16 20:29:22)

27 In another example, viewers thank the streamer: "Xiao Mage, thank you for answering my questions, I
28 really like your streaming." (No. 3380433, 2019-12-16 21:17:34).

29 One interviewee emphasised the importance of the interaction with streamers by stating: "I could only
30 be a quiet viewer when watching events on TV and commentators' comments are for the public viewers only.

1 However, on this platform, the streamers sometimes select my questions and answered them for me [...]; I feel I
2 am being noticed.” The viewers can derive social value from the social interaction when interacting with
3 streamers.

4 Although viewers are the main beneficiaries of the platform, they also contribute to other viewers. In line
5 with the research conducted by Pongsakornrungrungsilp and Schroeder (2011), more experienced viewers on the
6 SLSPs can contribute knowledge and information value to other viewers in the SLSP community. The viewers
7 participate in the value co-creation process by sending real-time messages to comment on the match, covering
8 topics such as techniques, strategies, scores, players’ conditions, styles, and so forth. The following post is an
9 example of a contribution on the subject of table tennis techniques knowledge posted by an experienced sports
10 viewer: “Xu Xin relies on his forehand attack too much; his backhand is too weak in the rally due to his incorrect
11 position.” (No. ‘5678197’,2019-12-15 19:37:04).

12 The viewers can acquire knowledge by interacting with other viewers individually in the joint sphere.
13 This is emphasised by an interviewee who stated: “I like to read the real-time messages as I can learn from other
14 viewers who are very professional.”

15 4.1.2 Co-create value collectively in the joint sphere

16 Recent service marketing literature has mainly explored the customer perceived value from direct interactions
17 with streamers in live streaming commerce (Lu et al., 2018). However, we state that without analysing the form
18 of interaction in a network, this definition is too narrow. In fact, the live streaming communities are relationship-
19 oriented online communities (Wohn and Freeman, 2020). There exist two levels of social contact, one of which
20 is between streamers and viewers, while the other is between viewers. In this kind of community, the real-
21 time interactions among streamers, viewers, and other viewers facilitate the collective value co-creation of
22 viewers. For example, this study found that the viewers could derive a strong social value through interaction with
23 streamers and with peers at the same time. The streamers in live streaming rooms often act as introducers who
24 bridge the gap between viewers. To illustrate this, one viewer interviewee stated that: “Streamers like to say a
25 specific viewer name and review his/her opinions. I then got familiar with this viewer, and I will pay attention to
26 his messages and even say hi to him next time. I feel a strong sense of belonging in the community.”

27 Meanwhile, viewers also acknowledged that a symbolic value of self-identity is perceived when they
28 help streamers answer other viewers’ questions about techniques and equipment. As one interviewee described:
29 “I have some reputation in Xiao Mage’s live streaming room. I like to answer questions for all as it allows me to
30 share my knowledge. I can also feel a sense of achievement when doing this.”

1 Similarly, viewers are able to derive collective value by interacting with streamers by sending messages
2 and virtual gifts. This gifting action is shared with all viewers in the streaming room, and are one way to show
3 one's appreciation and admiration for the streamer (Lu et al., 2018). Our data show that many viewers
4 acknowledge sending expensive gifts enhances their perceived self-identity because the admiration of other
5 viewers. The following comment reflects this notion: "I can not only attract the streamer's attention by sending
6 expensive gifts, but other viewers will also notice that I am supporting the streamer." These viewers want to
7 differentiate themselves from other viewers, making their watching experience more meaningful.

8 The viewers are embedded in the live streaming process by cheering for their teams or criticising
9 opponents through interacting with streamers and other viewers in the form of posting real-time messages or
10 sending virtual gifts. These real-time messages are shown on the open viewer chat. They are automatically
11 animated over the stream screen, which is called Danmu (Fan et al., 2018). In the context of watching a sporting
12 event on site, other fans' and spectators' behaviours, such as singing battle chants, contribute to the atmosphere
13 at a sports stadium (Uhrich and Benkenstein, 2012). On SLSPs, these real-time messages and virtual gifts are
14 important components of the live streaming room atmosphere. The following sample posts demonstrate how the
15 viewers contribute to the environment: (1) "Capital Long, come on, you will definitely win." (No. '2988794',
16 2019-12-15 20:31:26); (2) "Capital Long, I love you" (No. '1584995', 2019-12-15 20:31:33). Some
17 interviewees firmly believe that reading Danmu is entertaining. For example, one interviewee illustrates his
18 perceived value of entertainment when viewing the sporting events on SLSPs as follows: The Danmu fly across
19 the screen, and they include others' thoughts, jokes, and even quarrels [...]. I like to watch the Danmu. It provides
20 me with a special experience that is full of entertainment.

21 *4.2 Value co-creation in the customer sphere*

22 In the customer sphere, the value co-creation process involves indirect interaction between viewers and other
23 actors. The actors cannot directly interact with viewers in the value co-creation process, instead, viewers acquire
24 value perception independently. The indirect interaction on the SLSPs networks includes two main value co-
25 creations: platform-to-viewers and players-to-viewers (see Figure 2).

26 *4.2.1 Co-creation of value individually in the customer sphere*

27 On the SLSPs, customer experience can be shaped in an indirect form. According to Grönroos & Voima(2013), the
28 firm can access a joint value co-creation process with customers through a dialogical manner. However, the
29 platform company can only offer certain services to impact viewers' watching experiences. Once the viewers
30 engage in these services, the platform company is no longer interacting with viewers in real time. The services

1 provided by SLSPs include a mobile APP, comprehensive supply of sporting content, 360° view and angle
2 switching view, and a simple and concise interface.

3 SLSPs enable viewers watch the events whenever and wherever they want as long as they carry their
4 mobile phone with them. An interviewee explained that the platform APP is the best way to watch sporting games
5 due to the limited access to TV and the inconvenience of carrying a laptop around all the time. Moreover, the rich
6 sport event contents offered by the platform is another value contributor that has been acknowledged by the
7 majority of interviewees. CCTV5 (China Central Television Sports Channel) only broadcasts the most important
8 matches of big events, such as the semi-finals and finals of the Olympic Games, World Championships, and World
9 Cup. However, once a SLSPs on the broadcasting copyright of a sports event, the SLSP streams all the events,
10 including Opens, the Grand Prix, Leagues, and even domestic games, from group matches to the semi-final and
11 final.

12 Except for the widely-acknowledged perceived functional values the viewers acquire from SLSPs, the
13 360° and multi-screen view and concise interface can provide flow experience (Chen and Lin, 2018) and make
14 them feel as though they are at the sport event stadium. One interviewee mentioned that “I can watch the game
15 from different viewing angles, like the referee’s angle or the player’s angle, with just a simple click.”

16 The other actor in this indirect value co-creation process is the player. Although the players are not on
17 the platform and cannot directly interact with other actors, their performance is an indispensable factor that shapes
18 the viewers’ experiences. The viewers who are professional players or former professional players are mainly
19 focusing on watching the game and rarely interact with other viewers and streamers. The motivation for these
20 viewers is to learn advanced and useful techniques from the players. As one interviewee explained: “I just want
21 to focus on watching the competitions and to see if there is anything I can learn from the players. I normally watch
22 the game in the horizontal view with a zoomed-in view of the screen to avoid distractions.”

23 Similarly, some of interviewees recall that their viewing experiences would vary depending on how well
24 their favourite players were performing. For instance, one interviewee, who is a fan of Xin Xu and Zhendong Fan,
25 mentioned: “I would be very happy and excited if Xin Xu and Zhendong Fan showed a good performance and
26 won the matches. However, if they did not perform well and lost the match then I would feel sad.”

27 4.2.2 Co-create value collectively in the customer sphere

28 In the customer sphere, the viewers’ value perceptions can also be formed in a social and collective value co-
29 creation process, which is still independent from players, platforms, and their actions. One interviewee stated that
30 “I sometimes follow other viewers in sending real-time messages to cheer players on. I am not a fan of any

1 particular player; I like the sports of table tennis and perceive watching it as an entertainment activity and cheering
2 on the players with others makes watching the events more interesting.” However, some viewers would like to
3 acquire a sense of community. As one interviewee explained: “being part of the fan community makes me feel
4 closer to my idols.” In addition, the perception of some less experienced viewers towards player performance can
5 be impacted by other viewers and streamers. These viewers have a lower level of sports identification and player
6 identification. Their value perception would easily be shaped by the streamers framing skills and other viewers’
7 comments.

8 The viewers’ value perception of using the platform can also be influenced by streamers and other
9 viewers. The following posts are examples of viewers asking for help with using the multi-view function of the
10 platform: “Streamer, how can I watch the game from the coach’s angle”. Room managers, who are selected by
11 the streamer, are knowledgeable on the subject of table tennis and are expected to answer the questions posed by
12 different viewers. The key responsibility of room managers is to harmonise the language environment of the room
13 in order to provide viewers with a harmonious viewing atmosphere. To achieve this harmonisation, room
14 managers can mute anyone who misbehaves and even eject individuals out of the streaming room. Some viewers
15 would also ask the room manager to manage the streaming room by pointing out that they are not satisfied with
16 the viewing experience: “Room manager, please eject “Heaven Birds” out of the streaming room; he is cursing
17 players all the time” (No. ‘1584995’, 2019-12-15 20:31:33). In this capacity, the watching experience of
18 viewers when using SLSPs can be enhanced through the collective and social value co-creation process.

19 **5. Discussion and Conclusion**

20 *5.1 Theoretical implications*

21 Informed by the findings of the netnography and interviews, we build on Grönroos and Voima (2013)’s work on
22 the process of value creation with an SDL perspective, and provide a contribution through a specific focus on
23 SLSPs. Our results identify several specific contributions to our understanding of the value creation process in a
24 SLSPs services context from the joint and customer spheres. These contributions are outlined below.

25 First, this study has revealed the value co-creation process between the sports viewers and multiple actors
26 (the platform, streamers, viewers, and players) on the SLSPs. The findings have enriched the understanding of the
27 meso-level value co-creation within SLSPs. By adapting the VCS model from Grönroos and Voima (2013), we
28 have re-defined the value co-creation process of both the joint sphere and customer sphere on the SLSPs. In line
29 with the SDL (Vargo and Lusch, 2016; Vargo et al., 2008), we agree that the value co-creation no longer takes
30 place in the dyadic firm-customer relationship. Rather, there exists a more complex relationship in which the

1 platform has limited control over the value co-creation process. The sports live streaming platforms no longer
2 directly interact with sports viewers as firms do in the traditional service business. SLSPs provide a platform for
3 different actors to co-create value. The platform, streamers, players, and sports viewers are identified as the four
4 actors who provide a set of unique contributions to the sports viewers' watching experiences directly and
5 indirectly.

6 Second, this study developed Grönroos and Voima (2013)'s model and has proven that customer-
7 customer value co-creation can happen in a joint sphere and the firms-customers value co-creation can emerge
8 individually and collectively in the customer sphere. The sports viewers can interact with other viewers and
9 streamers in real-time in the live streaming room and can be influenced by them through active dialogue. However,
10 the platform and the players cannot interact with sports viewers through direct dialogue, but only provide value
11 propositions in the customer sphere. It is worth noting that the value contributions of streamers and viewers are
12 relatively vague as they not only interact with viewers directly in a joint sphere, but they also facilitate the
13 collective value co-creation of viewers in both the joint and customer sphere.

14 Third, based on our results, we argue that the sports viewers' perceived values are influenced by both
15 the direct and indirect interaction of multiple actors and the social contact in a collective manner. We revealed the
16 viewers' perceived value in the different manners. The viewers who prefer watching matches quietly with limited
17 interaction can fully focus their attention on the players' performances. Thus, they would acquire more epistemic
18 value. The sports viewers who have more positive interactions can not only acquire knowledge but also be
19 entertained through making friends by watching sports events on SLSPs.

20 *5.2. Managerial implications*

21 As the findings illustrate, SLSPs' interactions with sports viewers are not direct. However, they could provide
22 value propositions to impact viewers' value-in-use directly. Therefore, we suggest that SLSPs aggressively adopt
23 technologies such as VR, 360-degree view, as a primary service features. Such tools may help maintain the
24 existing customer base and attract new customers by providing a higher level of flow and enhancing the immersive
25 viewing experience of sports events. Meanwhile, providing all kinds of sports events are important for SLSPs to
26 attract viewers. As previously indicated, the communal power of viewers and the streamers plays a decisive role
27 in the value co-creation process. They can facilitate the value co-creation in both the customer sphere and joint
28 sphere. Therefore, SLSPs firms could design more interactive interfaces, and customised virtual gifts to enhance
29 the interactions between both viewers and streamers, and among viewers. Meanwhile, rules and incentive

1 mechanisms should be set to motivate streamers to find more useful ways, such as making jokes, singing songs,
2 and setting quizzes, to commentate on sports matches and communicate with viewers.

3 **6. Limitations and future research**

4 Although this study has offered many insights into the meso-level value co-creation process on SLSPs, thus
5 making contributions to both the academic field and business practices, it is undeniable that there are limitations.
6 First, although this study has analysed the value co-creation process at the meso-level, the researcher has only
7 used the customer (viewer) perspective to examine the value outcomes. This meso-level value co-creation should
8 be broadened in future studies to explore the mutual interaction and the value co-creation of all actors who are
9 involved in the value networks. Second, the researcher has only adopted case study as the research method.
10 Therefore, future studies can adopt quantitative research methods to examine the perceived value of viewers
11 towards different actors. In addition, other sports and countries can be used as research case studies so that a more
12 comprehensive understanding of the value co-creation of sport live streaming services can be generated.

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Appendix 1: A overview of the interview data.

No.	Sport experience/ Watching frequency	Actors and value proposition	Viewer engagement behaviours	Perceived value
1	Was training table tennis in the University/ everyday	<p><i>*Streamers: comments; communication; Knowledge</i></p> <p><i>*Other viewers: comments, information, communication</i></p> <p><i>*Platform: rich content, multi-screen switch, multiple views</i></p> <p><i>Players: performance</i></p>	<ul style="list-style-type: none"> • Direct interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> <i>*Sending real-time messages to ask questions of the streamer and listen to their comments.</i> <i>*Sending real-time messages to chat with other viewers in terms of players performance, background, and so on.</i> <i>*Sending virtual gifts</i> <i>*Sending real-time messages</i> 2. Collective: <ul style="list-style-type: none"> <i>Reading real-time messages from other viewers'.</i> • Indirect interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> <i>*Watching games.</i> <i>*Using the functions of the platform.</i> 2. Collective: <ul style="list-style-type: none"> <i>Reading other viewers' messages to understand the players' performances.</i> 	<p><i>*A sense of company</i></p> <p><i>*Knowledge acquisition</i></p> <p><i>*Social interaction</i></p> <p><i>*A sense of community</i></p> <p><i>*Service environment</i></p>
2	<i>Was a professional player/ at least once a week</i>	<p><i>*Streamers: comments, communication.</i></p> <p><i>*Other viewers: comments.</i></p> <p><i>*Platform: APP, rich content, 360-degree view, multiple viewing angles</i></p> <p><i>Players: performance</i></p>	<ul style="list-style-type: none"> • Direct interaction: <ol style="list-style-type: none"> 1. Individual: <i>N/A</i> 2. Collective: <i>N/A</i> • Indirect interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> <i>*Watching games.</i> <i>*Using the functions of the platform.</i> 2. Collective: <ul style="list-style-type: none"> <i>*Following others in sending virtual gifts to cheer for players.</i> 	<p><i>*Entertainment</i></p> <p><i>* Professional technique knowledge</i></p> <p><i>*Flow</i></p>
3	<i>A fan of table tennis and basketball/ everyday</i>	<p><i>*Streamers: professional comments, appearance.</i></p> <p><i>*Other viewers: answering questions</i></p> <p><i>*Platform: APP, rich content; multiple view, shopping</i></p>	<ul style="list-style-type: none"> • Direct interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> <i>*Sending real-time messages to correct streamers' comments.</i> <i>*Sending real-time messages to answer other viewers' questions in terms of plyers techniques, equipment, styles and so on.</i> <i>*Listening to the streamers' comments</i> <i>*Sending virtual gifts</i> <i>*Sending real-time messages</i> 	<p><i>*Entertainment</i></p> <p><i>*Endorsement</i></p> <p><i>* Professional technique knowledge</i></p> <p><i>*Flow</i></p> <p><i>* a sense of accompany</i></p>

		<i>Players: performance</i>	<p>2. Collective: <i>Reading real-time messages from other viewers.</i></p> <ul style="list-style-type: none"> • Indirect interaction: <p>1. Individual: <i>*Watching games</i> <i>*Using the functions of the platform</i> <i>*Sending virtual gifts and real-time messages to cheer for players.</i></p> <p>2. Collective: <i>*Watching other viewers send virtual gifts to players.</i> <i>*Listening to streamers to comment on players and have a new understanding.</i></p>	
4	<i>A fan of sports/ watch everyday in match-season</i>	<p><i>*Streamers: comments; communication; style.</i> <i>*Other viewers: comments; answer questions; information; communication</i> <i>*Platform: rich content; multiple view</i> <i>Players: performance</i></p>	<ul style="list-style-type: none"> • Direct interaction: <p>1. Individual: <i>*Sending real-time messages to ask streamer questions and listen to their comments.</i> <i>*Sending real-time messages to chat with other viewers in terms of players performance, background and so on.</i> <i>*Sending virtual gifts</i> <i>*Sending real-time messages.</i></p> <p>2. Collective: <i>Reading real-time messages other viewers' chatting.</i></p> <ul style="list-style-type: none"> • Indirect interaction: <p>1. Individual: <i>*Watching games</i> <i>*Using the functions of the platform</i></p> <p>2. Collective: N/A</p>	<p><i>*Entertainment</i> <i>* Professional technique knowledge</i></p>
5	<i>Was training Table tennis in childhood/ everyday</i>	<p><i>*Streamers: comments; style.</i> <i>*Other viewers: comments.</i> <i>*Platform: rich content; simple interface design; multiple viewing angles</i> <i>Players: performance</i></p>	<ul style="list-style-type: none"> • Direct interaction: <p>1. Individual: <i>* Watching games</i> <i>* Listening to the streamer's comments</i></p> <p>2. Collective: N/A</p> <ul style="list-style-type: none"> • Indirect interaction: <p>1. Individual: <i>*Watching games</i> <i>*Using the functions of the platform</i></p> <p>2. Collective: <i>*Following others in sending virtual gifts to cheer for players</i></p>	<p><i>*Atmosphere</i> <i>* A sense of accompany</i></p>

6	A fan of sports/once a week in match-season	*Streamers: comments, *Other viewers: sending real-time message *Platform: simple interface design; multiple view. Players: performance	<ul style="list-style-type: none"> • Direct interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> * Watching games * Listening to streamer's comments * Sending real-time messages 2. Collective: <ul style="list-style-type: none"> Read real-time messages from other viewers • Indirect interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> * Watching games * Using the functions of the platform 2. Collective: N/A 	*Service environment * Relax
7	Was training Table tennis in the University/ everyday	*Streamers: comments; communication. *Other viewers: comments; communication; *Platform: APP; simple interface design Players: performance	<ul style="list-style-type: none"> • Direct interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> * Watching games * Listening to streamer's comments 2. Collective: <ul style="list-style-type: none"> * Reading real-time messages from other viewers • Indirect interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> * Watching games * Using the functions of the platform 2. Collective: N/A 	*Entertainment * Professional technique knowledge * A sense of community *Service environment
8	A fan of table tennis and football/ once a week.	*Streamers: comments, communication, style *Other viewers: comments, communication. *Platform: APP, rich content, 360-degree view, multiple viewing angles Players: performance	<ul style="list-style-type: none"> • Direct interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> * Watching games * Sending gifts * Listening to the streamer's comments 2. Collective: <ul style="list-style-type: none"> * Reading real-time messages from other viewers • Indirect interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> * Watching games * Using the functions of the platform 2. Collective: <ul style="list-style-type: none"> * Cheering for players with other viewers 	*Entertainment * Professional technique knowledge * A sense of community *Service environment

9	A fan of Snooker and table tennis/every day.	<p><i>*Streamers: comments, communication, style, knowledge</i></p> <p><i>*Other viewers: comments, communication</i></p> <p><i>*Platform: APP, rich content</i></p> <p><i>Players: performance</i></p>	<ul style="list-style-type: none"> ● Direct interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> <i>* Watching games</i> <i>* Shopping</i> <i>* Listening to the streamer's comments</i> 2. Collective: <ul style="list-style-type: none"> <i>* Reading real-time messages from other viewers</i> ● Indirect interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> <i>*Watching games</i> 2. Collective: <ul style="list-style-type: none"> <i>*Watching other viewers cheer for players.</i> 	<p><i>* Professional knowledge</i></p> <p><i>* A sense of community</i></p> <p><i>*Service environment</i></p> <p><i>*Fans identification</i></p>
10	A fan of table tennis/every day.	<p><i>*Streamers: comments, communication, style, knowledge</i></p> <p><i>*Other viewers: comments, communication</i></p> <p><i>*Platform: APP, rich content, simple interface design</i></p> <p><i>Players: performance</i></p>	<ul style="list-style-type: none"> ● Direct interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> <i>*Sending real-time messages to ask streamer questions and listen to their comments.</i> <i>* Sending real-time messages to chat with other viewers about the players' performances, backgrounds and so on.</i> <i>*Sending real-time messages to answer other viewers' questions about the plyers' techniques, equipment, styles, and so on</i> <i>*Sending real-time messages</i> <i>* Blocking or kicking out viewers who behave badly</i> 2. Collective: <ul style="list-style-type: none"> <i>* Reading real-time messages from other viewers</i> <i>*Listening the streamer to answer other viewers' questions</i> ● Indirect interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> <i>*Watching games</i> 2. Collective: N/A 	<p><i>*Entertainment</i></p> <p><i>* Professional technique knowledge</i></p> <p><i>* A sense of community</i></p> <p><i>*Service environment</i></p> <p><i>*self-presentation</i></p>
11	A fan of table tennis and finishing/every day.	<p><i>*Streamers: comments, communication, style; knowledge</i></p> <p><i>*Other viewers: comments, communication.</i></p>	<ul style="list-style-type: none"> ● Direct interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> <i>*Sending real-time messages to chat with other viewers about the players' performances, backgrounds and so on.</i> <i>*Sending real-time messages to answer other viewers' questions about the players' plyers techniques, equipment, styles, and so on.</i> 	<p><i>* Entertainment</i></p> <p><i>* Professional technique knowledge</i></p> <p><i>* A sense of community</i></p> <p><i>*Service environment</i></p> <p><i>*self-presentation</i></p>

		<i>*Platform: APP, rich content; simple interface design; easy to use Players: performance</i>	<i>*Adding friends on WeChat and other social media 2. Collective: N/A</i> <ul style="list-style-type: none"> • Indirect interaction: 1. Individual: <i>*Watching games</i> 2. Collective: N/A <i>*Cheering for players with other viewers</i> 	
12	A fan of table tennis/everyday	<i>*Streamers: comments, communication, style, knowledge *Other viewers: comments, communication. *Platform: APP, rich content; 360-degree view; multiple viewing angles Players: performance</i>	<ul style="list-style-type: none"> • Direct interaction: 1. Individual: <i>*Sending real-time messages to chat with other viewers in terms of players performance, background and so on. *Sending real-time messages to chat with other viewers about the players' performances, backgrounds, and so on. *Sending gifts. *Sending real-time messages.</i> 2. Collective: <i>* Reading real-time messages from other viewers</i> • Indirect interaction: 1. Individual: <i>*Watching games *Using the functions of the platform</i> 2. Collective: N/A <i>*Cheering for players with other viewers</i> 	<i>*Entertainment * Technique knowledge * A sense of community *Service environment *Flow</i>
13	Was training Table tennis in the Highschool/ every day in the match-season	<i>*Streamers: comments, communication. *Other viewers: comments, communication. *Platform: APP, simple interface design Players: performance</i>	<ul style="list-style-type: none"> • Direct interaction: 1. Individual: <i>* Watching games * Listening to the streamer's comments * Chatting with other viewers through real-time messages</i> 2. Collective: <i>* Reading real-time messages from other viewers</i> • Indirect interaction: 1. Individual: <i>*Watching games *Using the functions of the platform</i> 2. Collective: N/A <i>*Cheering for players with other viewers</i> 	<i>*Entertainment * Professional technique knowledge * A sense of community *Service environment</i>

14	Was training Table tennis in childhood/ at least twice a week	<p>*Streamers: comments, style.</p> <p>*Other viewers: comments.</p> <p>*Platform: rich content, simple interface design; multiple view</p> <p>Players: performance</p>	<ul style="list-style-type: none"> • Direct interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> * Watching games * Listening to streamer's comments 2. Collective: N/A • Indirect interaction: <ol style="list-style-type: none"> 1. Individual: <ul style="list-style-type: none"> *Watching games *Using the functions of the platform 2. Collective: <ul style="list-style-type: none"> Following other viewers in sending virtual gifts to cheer for players. 	<p>*Service environment</p> <p>* A sense of accompany</p> <p>*Flow</p>
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