

Article

# Sustainability of Live Video Streamer's Strategies: Live Streaming Video Platform and Audience's Social Capital in South Korea

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**Abstract:** Live streamers' power and attraction influence consumer behavior. This study focuses on streamer-central formed social capital and the relationship between streamers and audiences on live streaming video platforms (LSVP). First, we explored the impact of trust, norm of reciprocity, and network on social capital formation. Second, we investigated the effect of social capital on streamers' attributes (attractiveness, expertise, and trustworthiness) and on the audience's social capital formation. The main findings show that trust and network positively affect social capital. Social capital increases the level of streamers' attractiveness, expertise, and trustworthiness perceived by the audience, which facilitates sustainable development of the LSVP and the streamer. Perceived streamers' attractiveness negatively affects social capital formation, while perceived expertise positively affects it. To promote social capital development, streamers and operators of LSVPs should continuously emphasize social capital formation. Moreover, LSVPs should provide audiences with novel and interesting content to enable active networking. For sustainable development of LSVPs, when providing live streaming video services, streamers should deliver content that the audience perceives as based on their expertise rather than on their physical attractiveness.

**Keywords:** live streaming video; social capital; sustainability strategy

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## 1. Introduction

Since the introduction of the concept of sustainability in business research, many studies have been conducted on this topic [1,2]. This research focuses on the sustainability of live streaming video services using social capital theory.

The marketing tools adopted by enterprises have evolved in line with the changes in consumer lifestyles and advancements in information and communication technologies (ICT). Live streaming video platforms (LSVPs) have emerged as the most promising marketing channels, ahead of word of mouth, newspaper, advertising, Internet, and mobile phones [3]. Wikipedia defines LSVP as an "online streaming media simultaneously recorded and broadcast in real time." The global video streaming market size was valued at USD 36.64 billion in 2018, and is projected to register a compound annual growth rate of 19.6% from 2019 to 2025 [4]. Twitch, Periscope, Facebook Watch, YouTube Live, and Livestream are among the most widely used LSVPs globally; in 2019, Twitch recorded 9 billion hits per hour, a 20% increase over 2018. The valuation of LSVP firms is growing dramatically because of their increasing popularity among live streamers, who provide live content on LSVPs and are aware of the potential they hold. The power of live streamers depends on the number of their audiences/subscribers, with most famous live streamers having millions of followers. Therefore, Tfue, Shroud, and Summit1g—as the most popular live streamers—can influence their

subscribers' lifestyle, decision-making, and attitude to brands or products. To boost consumer purchase decision-making, an increasing number of companies are utilizing live streaming services as a sustainable marketing communication channel to access current and potential consumers. The power and attraction of live streamers induce consumers to readily accept messages that contain product information and influence their purchase behavior. Thus, the interdependency between streaming services and streamer and audiences/subscribers is a core topic in marketing research and practices.

Various scholars have focused on the streamer either as a firm's marketing tool or an individual. Understanding how the user or consumer utilizes LSVPs is also important to enhance a firm's value and maximize profit. Streamers enhance a firm's power and build trust through their large number of audiences/subscribers and may receive gifts or sponsorships from audiences/subscribers and supporters. Therefore, when a firm efficiently hires streamers in the field of marketing, consumers respond positively to its brand and product. However, few studies have investigated the relationship among live streaming service features, streamers, and the audience.

We attempt to illustrate the one-to-multiple relationship in LSVP using audience social capital theory. Social capital refers to the invisible power generated by the relationships among community members. Recent research on social capital reveals the diversity of disciplines where it is applicable, such as, government and citizens [5], entrepreneurial business [6], and social networking sites (SNSs) [7]. In this study, we investigate the relationship between the streamer—who provides live streaming video services—and the audience, by adopting social capital theory.

Live streaming services are provided through personal computers and mobile devices, and are based on the Internet. Falk [8] asserted that the main features of mobile Internet are mobility, localization, ubiquity, convenience, portability, personalization, and accessibility. The Internet offers the advantages of convenience, ease of accessibility, and bidirectional communication. On LSVPs, streamers can communicate with the audience instantly, who can simultaneously exchange their opinions with each other, thereby offering bidirectional communication and simultaneous trilateral communication—features that are significantly different from other communication channels. The interactions among streamers, an audience member, and other audience members depend on their communication means. First, the audience members discover impressive, informative, and helpful streamers based on an LSVP's level of convenience, portability, personalization, and accessibility. When a streamer and audience communicate with each other, positive emotions can be generated. From the social capital theory perspective, the audience watches the same streamer's contents, communicate with each other, share information on similar concerns, and then form social relationships/networks. However, compared to the streamer-central one-to-one relationship, audience members are jealous of their peers in the one-to-multiple audience relationship. Jealousy is a response to a perceived threat to a precious relationship or to the quality of a relationship [9]. Lazarus [10] highlighted that jealousy implies a triangle of relationships [10]. The streamer, one audience member, and other audience members simultaneously communicate on LSVPs, and through this mechanism, other members can feel jealousy, unlike on other platforms. Specifically, due to the streamer-centralized characteristic of the relationships on LSVPs, the effect of jealousy will differ depending on the nature of a certain streamer. Jealousy, as a harmful emotion, negatively affects social capital among the audience on LSVPs. In this study, we investigated the relationship between an audience member's jealousy and social capital with that of other audience members and determined how to sustainably enhance the social capital among participants in the context of LSVPs.

This work further focuses on streamer-central formed social capital and the relationship with the streamer to strengthen his/her power and influences within the LSVP. First, we explored social capital with regard to the LSVP. Based on prior research, we verified the mechanism of social capital formation on LSVPs. Second, we tested the actual impact of streamer-central formed social capital on the audience perception of the streamer's nature. Third, we verified the effect of the streamer's perceived nature by each audience member on social capital.

This study contributes to the literature in two ways. First, this article focuses on social capital formed in one-to-multiple relationships. Second, using nonrecursive analysis, it confirms streamers'

nature to interact with individual members of the audience on the LSVP. The results, which indicate how enterprises and streamers enhance social capital, have significant managerial implications.

The remainder of this article is organized as follows. Section 2 presents a review of the related literature and our hypotheses development. Section 3 describes the research framework and methods. The empirical analysis, using survey data collected from South Korea, is detailed in Section 4. Finally, Section 5 concludes with a discussion on this work's limitations and future research directions.

## 2. Literature Review and Hypotheses

The development of ICT has not only enabled the sharing of information easily with others, but also provided the opportunity of bidirectional (two-way) communication between information senders and receivers. For example, digital consumers can access online information through electronic devices such as computers, tablets, and smartphones, wherever and whenever they need. The deployment of technology in the social sphere has resulted in a migration of social networks from offline to online mediums. Such phenomena and the ease of access has stimulated social media, SNSs—online services that facilitate smooth interaction among users—have seen explosive growth [11]. SNSs play an important role in building and maintaining online relationships and have become platforms to not only express opinions but also communicate with others and share similar personal interests. With the development of SNSs, the concept of influence marketing has emerged, which is being extensively adopted in business practices [12]. LSVPs have evolved based on SNS platforms. For example, LSVPs such as Periscope, Facebook Watch, and YouTube Live are based on Twitter, Facebook, and YouTube, respectively—all of which are SNSs. On an LSVP, a streamer provides attractive content such as games and live songs for the audience. The essential gap between extant media and LSVPs is that the latter provide real-time communication that is triangular rather than two-way—among the content provider, an individual, and other audience members. Trust develops among audience members who have similar objectives in consuming streamers' content during mutual communication. Through sustainable communication and interaction, trusted relationships are formed, which finally develop into social capital.

In addition to sociology, politics, and economics, social capital is an important research stream in business studies. Although many studies have been conducted on social capital, it still remains a broad, abstract concept [13]. Putnam [14,15] defined social capital as “a propensity of people in a society to cooperate to produce socially efficient outcomes” and highlighted “the norms of reciprocity and trustworthiness network” that arise from connections among individuals. Coleman [16] concluded that a common purpose and trust are essential factors in the creation of social capital [16]. Uslaner [17] pointed out that trust and membership promote cooperation among individuals and connections. Although high reciprocity norms may decrease in network creation, it may strengthen the solidarity of members [16]. Based on social network characteristics, Putnam [14,15] categorized social capital into bonding and bridging social capital. In recent years, however, researchers have proposed a vertical dimension of social capital called linking social capital [18]. Bonding social capital helps in undergirding specific reciprocity and mobilizing solidarity [15]; bridging networks are better for linkage to external assets and for information diffusion [19]. Bonding and bridging social capital are the horizontal dimensions [18]. Bridging social capital can generate broader identities and reciprocity, whereas bonding social capital bolsters our narrower selves [15]. “Linking social capital” [20,21] indicates the relationship among representatives of formal institutions like banks and the state (community or policeman). In the context of an LSVP, although individual audience members have distinguished values, their relationships are formed based on common interests. Therefore, mainly bridging social capital is generated among LSVP participants.

In this study, we investigated the formation of bridging social capital, which is generated around streamers on LSVPs. Social capital is related to trust, norm of reciprocity, and networks based on a specific purpose within groups. Therefore, trust—as an antecedent factor of social capital—is positively correlated to bridging social capital. Hughes and Stone [22] classified social trust into two types: familiar/personal and generalized. Other researchers categorized trust as interpersonal or institutional [23–26]. In this study, we measured generalized trust for social capital among audiences

on an LSVP. The norm of reciprocity is the belief that peers mutually provide help in times of need [27]. However, it is difficult to mutually help each other on a streamer-oriented platform. In addition, due to ease of exit and accessibility of streaming services, users of online communication who pursue simplicity and enjoyment perceive the norm of reciprocity as unnecessary. Consequently, the norm of reciprocity obstructs the formation of social capital. Therefore, we presume that the norm of reciprocity is negatively associated with social capital. Network indicates how many and how frequently members participate. Network is at the core of relationships, and diffuses information, messages, and interests. According to the extant literature, network positively affects formation of social capital as well as trust. Thus, the following hypotheses are proposed.

H<sub>1</sub> The trust among audiences on an LSVP positively affects the formation of streamer-oriented social capital.

H<sub>2</sub> The norm of reciprocity among audiences on an LSVP positively affects the formation of streamer-oriented social capital.

H<sub>3</sub> The network among audiences on an LSVP positively affects the formation of streamer-oriented social capital.

In the following section, we examine the social capital of an LSVP and the characteristics of a streamer. There are two streams of research on the advertising model. One focuses on the effect of different types of advertising models, such as celebrity, expert, and general person, on advertising. The other investigates the effect of information sources' attributes (e.g., credibility, reliability, expertise) on the advertising model. Regardless of whether one is a celebrity, professional, or general person, it is easy to provide live streaming services on an LSVP. Thus, in the relationships among streamers, audience, and advertisers, source credibility has become extremely important, compared to the advertising model. Source credibility is a proxy variable for the attributes of information sources. Source credibility implies a communicator's positive characteristics that affect receivers' acceptance of a message [28]. Hovland and Weiss [4] analyzed the factors impacting the perceived credibility of communicators and identified two factors, namely, expertise and trustworthiness. Hovland, Janis, and Kelley [29] defined expertise as "the extent to which a communicator is perceived to be a source of valid assertions," and trustworthiness as "the degree of confidence in the communicator's intent to communicate the assertions he considers most valid." The source-attractiveness model has its origins in social psychological research, and is a part of the "source valence" model of McGuire [30]. According to the attractiveness model, familiarity, likability, similarity, and attractiveness are the source of effectiveness of message [31].

Self-determination theory [32,33] posits that the three basic human needs—autonomy, competence, and relatedness—must be satisfied for an individual to have a healthy level of well-being. The need for relatedness means the level of social connectedness people need [34]. Different individuals desire different levels of connectedness [34]. Humans are born with the "need for relatedness," based on which they seek to build relationships. In addition, the need for approval and intimacy are a particular appeal during adulthood. Need for intimacy was defined as experiencing a warm, close, and communicative exchange with another person [35]. The need for intimacy relates to mutual understanding, deep relationship, and privacy sharing. Social capital, which is streamer-orientated on online platforms, contributes to the construction of members' communication networks to share information and enhance their understanding of the streamer as well as meet their need for intimacy. Therefore, the audience members on LSVPs listen more carefully to streamers, communicate with streamers and other audience members, and passively improve their perception of streamers' attributes.

The audience's positive or negative attitude arises from unique and differentiated contents provided by streamers. The members' social capital perception of streamers' attributes is analogous to the audience's perception of the advertising channel's attributes. Attractiveness, expertise, and trustworthiness are the components of credibility. Trustworthiness measures adopted personal trust, which is different from generalized trust referred to in H<sub>1</sub>. Correspondingly, expertise and attractiveness refer to streamers' attributes perceived by the audience, which is distinct from community expertise and attractiveness.

Based on the literature, the following hypotheses are proposed.

H<sub>4</sub> Individual audiences with high streamer-orientation formed social capital perceive streamers as more attractive.

H<sub>5</sub> Individual audiences with high streamer-orientation formed social capital perceive streamers as having more expertise.

H<sub>6</sub> Individual audiences with high streamer-orientation formed social capital perceive streamers as being more trustworthy.

The relationship between social capital of the audience and streamers is not unidirectional. Streamers and the audience communicate in real time and interact with each other on an LSVP. Thus, the streamers' characteristics may affect social capital among the audience members. Increasing credibility leads to changes in adopter attributes [36]. Following Hovland and Weiss [36], credibility-related research has been conducted across various fields. Perceived credibility influences message evaluation, attitude change, behavior intention, and post-behavior actions [37]. Streamers do not exchange one-to-one information with individual audience members in a live streaming service; anyone can monitor the real-time text and voice chatting information. Thus, one may feel jealous in the vital environment of audience and streamer communication. Threats in existing relationships and challenges to self-concept and self-esteem are sources of jealousy [10,38]. Salovey and Rodin [39] and Salovey and Rothman [40] posit that people feel jealous when their competitors surpass them in areas where they expect to be important. Due to social capital formed streamer-orientation, live streaming services offer an environment where one may easily feel jealous when a streamer communicates with other audiences. Therefore, streamers' characteristics may affect social capital formation of the audience. According to credibility theory, a streamer's three dimensions are: (1) attractiveness, (2) expertise, and (3) trustworthiness [31].

With regard to attractiveness, several advertising- and communication-related studies reveal that physical attractiveness influences the audience's judgment about other people during the earlier stage [41–45]. Attractiveness primarily refers to physical features. The attractiveness of a streamer is shaped by his/her physical features, similarity, familiarity, and likeability [46]. Favorable streamers passively communicating with other audience members triggers jealousy in individuals. Given this jealousy aspect in the relationship between streamers and the audience, one audience member may harshly treat another member. Eventually, jealousy among the audience members decreases social capital among the audience.

Expertise refers to a certain skill, knowledge, or ability [47]. A streamer's expertise is his/her degree of information source credibility perceived by the audience, which recognizes and judges the streamer's expertise depending on his/her experience, ability, achievements, status, and knowledge on given topics. Expertise does not depend on physical features or favoritism towards a person. Therefore, a streamer's expertise does not arouse jealousy in an LSVP's audience, although it boosts social capital in providing information.

Trustworthiness is defined as "the perceived willingness of the source to make valid assertions" [48] and relates to consumers' belief that an information source delivers a message in an objective and honest manner [31]. Trustworthiness is the perceived motivation of an information source to communicate a message without bias [46,49]. In the context of LSVPs, it relates to the streamer providing information in an honest and objective manner. If a streamer provides biased information or reports, the degree of trustworthiness will drop. Reduction in trustworthiness weakens trust in a streamer and reduces the viewership rate of his/her live content. On the contrary, perceived high trustworthiness engages the audience to immerse in live content. Increase in immersion has a positive effect on communication among members. It also enhances social capital in discussing and sharing information.

Based on the literature, the following hypotheses are proposed.

H<sub>7</sub> Perceived live streamer's attractiveness negatively affects social capital formation.

H<sub>8</sub> Perceived live streamer's expertise positively affects social capital formation.

H<sub>9</sub> Perceived live streamer's trustworthiness positively affects social capital formation.

### 3. Method

### 3.1. Research Framework

This study investigated the interdependency between social capital formation and streamers' attributes within the LSVP framework. The conceptual framework is illustrated in Figure 1.

First, the impact of trust, norm of reciprocity, and network on social capital in the process of social capital formation was explored. Second, the effect of social capital on streamers' attributes (attractiveness, expertise, and trustworthiness) was confirmed. Third, the influence of streamers' attributes on the audience's social capital formation was examined. AMOS non-recursive analysis was adopted.

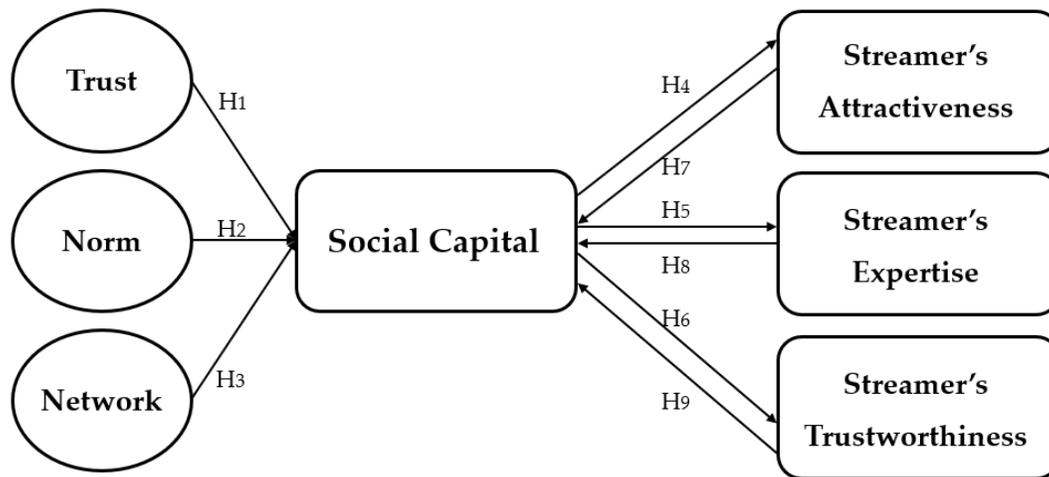


Figure 1. Research model.

### 3.2. Structural Equation Modelling

Structural Equation Modelling (SEM) is widely utilized in variety scientific disciplines such as marketing and marketing research [50,51], family business research [52], and psychology [53]. SEM has been developed to test complete theories and research concepts [51,54]. Initially, covariance-based structural equation modelling (CB-SEM) is an extensively employed and major method in SEM, which is generally denoted as SEM by many scholars [52]. Because SEM is a confirmatory technique, Schreiber et al. regards SEM as confirmatory factor analysis (CFA) and multiple regression [55]. However, some researchers have proposed the variance-based partial least squares (PLS-SEM) as alternative statistics methodology [51]. Before data analysis, CB-SEM, a confirmatory method, requires researcher to specify the full theoretical research model [52]. Hair et al., Ringle et al., and Astrachan et al. suggested that research may adopt PLS-SEM in the early stage of theoretical development and verification [56,57]. In terms of sample size, CB-SEM requires a sample of five times the number of indicators included in the research model [52].

In current research, the research concept framework is documented based on related literature and all measurement scales are revised based on prior research and well-developed scales. Moreover, the samples (201) used in this study were over the minimum requirement ( $5 \times 21$  indicators) of CB-SEM. Therefore, we chose the CB-SEM for statistics analysis and hypotheses testing.

### 3.3. Data Collection

Many folks use LSVP on their smartphones. According to Per Research Center, South Korea has the highest penetration rate of smartphones in 2018 [58]. Additionally, the Korea Communication Commission reported that 42.7 percent ( $n = 7,234$ ) of Koreans use Over-The-Top (OTT) services [59]. OTT means a service that provides various media content, including broadcasting programs, movies and education, through the Internet. OTT is heavily connected to LSVP. Therefore, we selected South Korea as research samples, which country's LSVP is well developed and activated. The data were

collected using a survey conducted in South Korea. All the respondents were users of LSVP to confirm the relationship between streamer's attributes and social capital. The survey comprised 25 items, including demographic questions. Information was collected from 201 participants (males 56%, females 44%). Table 1 presents the demographic description of the sample.

**Table 1.** Demographic description of the sample (N = 201).

Variable	Category	Obs. (Proportion)
Gender	Male	112 (56%)
	Female	89 (44%)
Age	10–19	32 (16%)
	20–29	89 (44%)
	30–39	72 (36%)
	40–49	8 (4%)
	50 or above	0 (0%)
Usage time	0–1 hour	10 (5%)
	1–2 hours	52 (26%)
	2–3 hours	68 (34%)
	3–4 hours	51 (25%)
	4–5 hours	14 (7%)
	5–6 hours	5 (3%)

### 3.4. Measurement Design

The measurement items were adapted based on prior research. Following Grootaert et. al. [60] and Stone [61], three antecedent variables of social capital were constructed: trust, norm of reciprocity, and network. To measure trust among the audience (communities), generalized trust was used rather than personal trust. To examine the network, the community network was investigated, instead of the personal relationship network. Social capital was measured using three-item bridging social capital scales following Ellison, Steinfield, and Lampe [62]. The perceived credibility of a streamer's attributes as assessed by Ohanian's [31] scales were revised to align with this study. All the items used in this study are presented in Table 2. We used a seven-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree").

## 4. Empirical Results

### 4.1. Reliability and Validity

Initially, confirmatory factor analysis (CFA) was adopted to test reliability and validity. According to the results of the reliability test for each scale, the composite reliabilities of all the variables were between 0.804 and 0.957; values above 0.6 [63] indicate good reliability of the questionnaire. The average variances extracted (AVE) of all the variables ranged between 0.579 and 0.880; values above 0.5 indicate good convergent validity of the measurement variables [63,64]. The Cronbach's  $\alpha$  was larger than 0.7 [65]. The factor loadings of all constructs were higher than 0.5, suggesting construct validity [64].

The means, standard deviations, and correlations among the constructs are presented in Table 3. As argued by Coleman [16], it is difficult to distinguish between trust, norm of reciprocity, and network because of high correlation. The result of the correlation analysis in this study reveals high correlation among trust, norm of reciprocity, and network. However, high correlation implies good measurement of the antecedents of social capital in LSVP. The square roots of the AVEs for social capital and streamers' attributes were greater than the correlation levels [64]. It indicates that measurement validity was confirmed. Thus, path analysis was conducted next.

**Table 2.** Results of factor loadings, reliability, and validity tests.

Items	Estimate	Cronbach's $\alpha$	AVE	CR
Trust				
I trust the relationship among live streaming video audiences.	0.840	0.891	0.734	0.892
I believe the relationship among live streaming video audiences.	0.851			
I believe the relationship among live streaming video audiences is reliable.	0.877			
Norm of reciprocity				
I want to help other audience members on live streaming video platforms.	0.773	0.804	0.579	0.804
I often get help from other audience members on live streaming video platforms.	0.763			
I believe audience members help each other on live streaming video platforms.	0.745			
Network				
I cooperate with other audience members on live streaming video platforms.	0.821	0.873	0.579	0.804
I actively participate in live video streaming broadcasts.	0.86			
I frequently collaborate with other audience members on live streaming video platforms.	0.822			
Social Capital				
Interacting with people at live streaming video broadcasts that I frequently watch makes me want to try new things.	0.838	0.896	0.721	0.886
Interacting with people at live streaming video broadcasts that I frequently watch makes me feel like a part of a larger community.	0.885			
Interacting with people at live streaming video broadcasts that I frequently watch reminds me that everyone in the world is connected.	0.862			
Streamer Attractiveness				
Attractive	0.787	0.858	0.671	0.859
Handsome/Beautiful	0.808			
Sexy	0.865			
Streamer Expertise				
Expert	0.921	0.956	0.880	0.957
Experienced	0.967			
Qualified	0.929			
Streamer Trustworthiness				
Honest	0.882	0.921	0.799	0.923
Trustworthy	0.914			
Dependable	0.887			

Notes: CR: Composite reliability; AVE: Average variance extracted.

**Table 3.** Correlations.

Variables	Correlation						
	1	2	3	4	5	6	7
Trust	1						
Norm of reciprocity	0.710 (0.504)	1					
Network	0.831 (0.69)	0.744 (0.554)	1				
Social Capital	0.722 (0.521)	0.588 (0.346)	0.817 (0.667)	1			
Attractiveness	0.538 (0.289)	0.548 (0.300)	0.654 (0.428)	0.756 (0.571)	1		
Expertise	0.585 (0.342)	0.519 (0.269)	0.62 (0.384)	0.674 (0.454)	0.716 (0.513)	1	
Trustworthiness	0.761 (0.579)	0.548 (0.548)	0.746 (0.557)	0.715 (0.511)	0.569 (0.324)	0.678 (0.472)	1

#### 4.2. Structural Model and Hypothesis Testing

AMOS version 23.0 was used to conduct SEM with CFA. The measurement model contained seven latent constructs (Figure 1). As evident in Table 4, the revised model exhibited an appropriate fit [ $\chi^2 = 271.433$  ( $p = 0.000$ );  $DF = 168$ ;  $CFA(\chi^2/df = 1.607)$ ; goodness-of-fit index (GFI) = 0.894; root mean square error of approximation (RMSEA) = 0.055; comparative fit index (CFI) = 0.971; normalized fit index (NFI) = 0.928; adjusted goodness-of-fit index (AGFI) = 0.854; standardized root mean square residual (SRMR) = 0.0366].

After examining the fit of the structural model, we examined the relationship among trust, norm of reciprocity, and network and social capital. The results indicate that trust ( $\beta = 0.497$ ,  $p < 0.05$ ) and network ( $\beta = 0.996$ ,  $p < 0.001$ ) have positive effects on social capital, supporting  $H_1$  and  $H_3$ . However, norm of reciprocity has no significant effect on social capital.

Next, the relationship among social capital and the three dimensions of streamers' attributes was investigated. The path from social capital to streamers' attractiveness ( $\beta = 0.797$ ,  $p < 0.001$ ), expertise ( $\beta = 0.699$ ,  $p < 0.001$ ), and trustworthiness ( $\beta = 0.971$ ,  $p < 0.001$ ) are positive and significant, supporting  $H_4$ ,  $H_5$ , and  $H_6$ .

Finally, the path from the three dimensions of streamers' attributes to social capital was confirmed. The data show that streamers' attractiveness ( $\beta = -0.748$ ,  $p < 0.05$ ) has a negative effect on social capital, while expertise ( $\beta = 0.192$ ,  $p < 0.1$ ) has a partially positive effect on social capital, supporting  $H_7$  and  $H_8$ . However, trustworthiness has no significant impact on social capital.

For the path empirical results, refer to Tables 5 and 6, which present a summary of the hypotheses verification tests.

**Table 4.** Summary of model fit.

Fit Index	Ideal Value	Result	Conclusion
$\chi^2/df$	<3	1.607	Acceptable fit
GFI	>0.9 (good fit) 0.8–0.89 (acceptable fit)	0.894	Acceptable fit
AGFI	>0.9 (good fit) 0.8–0.89 (acceptable fit)	0.854	Acceptable fit
CFI	>0.9	0.971	Good fit
NFI	>0.9	0.928	Good fit
RMSEA	$\leq 0.05$ (close fit) 0.05–0.08 (fair fit) 0.08–0.10 (mediocre fit)	0.055	Fair fit
Standardized RMR	$-1 < \text{Standardized RMR} < 1$ (good fit)	0.0366	Good fit

Note: GFI, goodness-of-fit index; AGFI, adjusted goodness-of-fit index; NFI, normalized fit index; CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, Standardized root man square residual

**Table 5.** Empirical results.

Path	Estimate	S.E.	C.R.	P
Trust $\rightarrow$ Social capital	0.497	0.193	2.523	**
Norm of reciprocity $\rightarrow$ Social capital	−0.126	0.183	−0.901	0.368
Network $\rightarrow$ Social capital	0.996	0.34	3.473	***
Social capital $\rightarrow$ Attractiveness	0.797	0.08	9.396	***
Social capital $\rightarrow$ Expertise	0.677	0.084	9.474	***
Social capital $\rightarrow$ Trustworthiness	0.971	0.093	10.789	***
Attractiveness $\rightarrow$ Social capital	−0.748	0.264	−2.752	**
Expertise $\rightarrow$ Social capital	0.192	0.09	1.807	*
Trustworthiness $\rightarrow$ Social capital	−0.054	0.173	−0.331	0.741

\*\*\* <0.00, \*\*<0.05, \*<0.1.

**Table 6.** Summary of hypotheses testing.

Hypothesis	Content	Verification
H <sub>1</sub>	Trust $\rightarrow$ Social capital	Supported
H <sub>2</sub>	Norm of reciprocity $\rightarrow$ Social capital	Rejected
H <sub>3</sub>	Network $\rightarrow$ Social capital	Supported
H <sub>4</sub>	Social capital $\rightarrow$ Attractiveness	Supported
H <sub>5</sub>	Social capital $\rightarrow$ Expertise	Supported
H <sub>6</sub>	Social capital $\rightarrow$ Trustworthiness	Supported
H <sub>7</sub>	Attractiveness $\rightarrow$ Social capital	Supported
H <sub>8</sub>	Expertise $\rightarrow$ Social capital	Supported
H <sub>9</sub>	Trustworthiness $\rightarrow$ Social capital	Rejected

## 5. Discussion, Limitation, and Future Work

### 5.1. Discussion and Conclusion

This study investigated the sustainability of live streaming video services using social capital theory, exploring the relationship between the audience and streamers. To test the hypotheses, we

examined the characteristics of streamers and audience members that affect social capital formation. The results show that trust has a positive effect on social capital formation in the context of LSVP. Therefore, for LSVP sustainability, streamers should exhibit trust to promote social capital among the audience. We did not find any significant impact of the norm of reciprocity on social capital. Owing to the ease of exit and accessibility and anonymity that LSVPs offer, the norm of reciprocity no longer influences social capital formation. In line with prior research, we found that the network among audience members is significantly associated with social capital formation. This result suggests that it is not streamers, but operators of LSVPs, who should continuously release interesting content to enhance social capital formation among the audience.

We also found that social capital increases the level of streamers' attractiveness, expertise, and trustworthiness perceived by the audience for sustainable development of LSVPs and streamers. However, the perceived attributes of streamers have a different effect on social capital. Streamers' attractiveness negatively affects social capital of an individual audience member. On LSVPs, communication between streamers and the audience takes place in a one-to-multiple rather than a one-to-one setting. Attractiveness refers to similarity, familiarity, and likeability [48]. An individual member feels jealous when he/she witnesses a perceived-as-attractive streamer communicating with other audience members. In this manner, streamers' attractiveness reduces the audience's social capital. However, streamers' perceived expertise passively influences his/her social capital. Streamers' expertise refers to their experience, skills, qualification, and social status rather than their physical characteristics [49]. Audience members will not feel jealous when a streamer's expertise makes him/her promote discussions on certain content and share information. Therefore, streamers' expertise improves the audience's social capital on an LSVP. Finally, streamers' trustworthiness has no significant effect on the audience's social capital. Trustworthiness is associated with honesty and reliability; on LSVPs and other online platforms, it relates to the spreading of fake news or unconfirmed information. However, streamers' honesty or reliability does not affect social capital formation. Therefore, some streamers positively provide comments on gossip or incendiary rumor regardless of whether they are trusted or not, aiming to increase audiences' interest.

To promote social capital development, streamers and operators of LSVPs should continuously boost the formation of social capital. Moreover, LSVPs provide audiences with novel and interesting content to facilitate active networking. For sustainable development of an LSVP, when providing live streaming video services, streamers should deliver content that the audience considers to be based on their expertise rather than on their physical attractiveness.

## 5.2. Limitation and Future Work

Although this study provides various insights, there are certain limitations that can be covered in future research. First, we adopted bridging social capital. Based on previous research, social capital can be classified as bonding, linking, and bridging. Although linking social capital is difficult to form, bonding social capital is formed in various situations. Therefore, it is possible to measure bonding social capital in the context of LSVPs. Second, this study does not differentiate between distinct types of information or content provided by streamers, which is a potential moderation variable. Future research could examine the moderation effect of the various types of information or content provided by streamers.

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