The Economics of Para-social Interactions During Live Streaming Broadcasts: A Study of Wanghongs

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A B S T R A C T

The rapid growth of economic transactions generated by live streaming broadcasts ("LSB") has created opportunities for retailers to increase sales. However, little is known about what impact LSB celebrities have on customers and what causes LSB celebrities to become famous. This study aimed to fill this gap by studying the economics of LSBs. This study was conducted through a para-social relationship and attractiveness theory framework. Consequently, social and task attraction were assumed to be the antecedents of the para-social relationship that induced purchase intention. This study examined the impact of relationship rewards, self-disclosure, affective interactivity, informative interactivity, and the amount of information provided on purchase intentions through LSB. Celebrities can use the results of this study to enhance their appeal to fans and promote customers' purchase on e-commerce. This study contributed to the IS field by investigate the impact of para-social relationship on the online shopping context.

Keywords: Para-Social Interactions, E-Commerce, Live Streaming Broadcasts, Attractiveness Theory, Internet Celebrities

Ⅰ. Introduction

Consumers' purchase decisions are influenced by other people. Face-to-face recommendations have traditionally been used to motivate sales (Hu et al., 2015) and celebrities play an important role in customers' decision making (Oh et al., 2015). However, information technology ("IT") development has

caused IT to play greater mediating roles in conveying product information (Kiang et al., 2000). However, IT cannot allow customers to physically experience a product before they actually use it (Chen et al., 2017). Given these constraints, many e-commerce companies used social media platforms to promote their products. Many e-commerce companies directly managed how their products were presented on social

media platforms by posting product information and responding to users' questions and comments. LSB celebrities do the same thing for their viewers. Companies can save money by using LSB celebrities to market their products instead of doing so directly through social media. Sales generated by LSB celebrities are rapidly increasing in the Asian market. Despite the remarkable growth of the influence that LSB celebrities have on consumers' purchasing decisions, they have received little attention from IS researchers. It is important for companies to identify how LSB celebrities influence their fans to make purchasing decisions to increase the effectiveness and efficiency of their marketing efforts.

LSB celebrities, known as Wanghongs in Chinese, build strategic social relationships with their viewers (Hua et al., 2017; Marwick, 2015). Some e-commerce companies use Wanghongs' influences for sales. For example, Taobao, the largest e-commerce company in China, launched a Wanghong LSB service in May 2016, receiving views from over 10,000,000 users in the first three months (Wu, 2017). These LSBs cover various product categories, including cosmetics, fashion, food, and health, though fashion and cosmetics LSBs account for the majority of content. LSB celebrities showcase products that customers can purchase with a few clicks during their broadcasts. For example, Eve Zhang, one of the most popular Wanghongs, introduced certain fashion products, delivered fashion tips, and modeled some clothes in response to customers' requests during one LSB, resulting in nearly RMB 16,000,000 (USD 2,500,000) in sales in only two hours (Chen et al., 2017).

Wanghongs establish trust with viewers by helping them reduce their costs of searching for new products. Consequently, Wanghongs promote sales by acting as trusted reviewers and introduce customers to new products (De et al., 2013; Joines et al., 2003; Spry

et al., 2011). Wanghongs have higher conversion rates, defined as the percentage of people who view an advertisement who actually purchase the product being advertised, than traditional digital advertising (Li, 2016). Global recommendation systems have an average conversion rate of 3% whereas Wanghongs had conversion rates of up to 30% in China in 2016 (Chen et al., 2017). This difference may have arises from the fact that shopping using the guidance of Wanghongs allows consumers to overcome the deficiencies of traditional e-commerce. For example, Wanghongs provide frank first-hand descriptions of their experiences with and opinions of products for consumers. They also provide more specific information than traditional advertising by answering questions posed to them in real time, reducing the consumer uncertainty about products that is inherent in internet shopping.

LSBs also feature para-social interactions ("PSI") in the form of relationships between the LSB celebrities and their fans. PSIs are different from ordinary social relationships because they are not one-to-one, but rather are one-to-many (Horton and Wohl, 1956). People understand that celebrities are physically distant from them but perceive them as being psychologically close. Recommendations from celebrities would be expected to be stronger than those that come from people sources with which consumers have no personal ties. LSB celebrities have PSIs with their fans (Hu et al., 2017), so the literature about PSIs in traditional media, such as television, can also be applied to the LSB context. Therefore the questions that this study sought to answer were:

1. What IT artifacts affect social and task attraction of LSB celebrities on LSB platforms?

2. How do these two types of attractions influence PSIs?

The objective of this study was to examine the determinants of the PSIs that influenced purchase intentions. This study examined how LSB celebrities' social and task attractions drive PSIs. A research model was proposed based on the results of this examination.

Ⅱ. Research Background

2.1. Internet Celebrities' Live Streaming Broadcast in e-Commerce

Many top-tier e-commerce companies try to host the most popular LSBs on their platforms to take advantages of LSB celebrities' reputation and influence with their audiences to drive sales. For example, only streamers who have 50,000 followers on social media can start their own LSBs on Taobao's platform. Platforms that host both LSBs and e-commerce systems are significantly different from existing channels, such as television shopping programs and online recommendation systems. In LSBs, the flow of information is bi-directional between the broadcaster and the audience and so encourage viewers to participate in the broadcasts. In contrast, the flow of information in television programs is generally uni-directional from the broadcaster to the audience (Sjöblom et al., 2017). There exists relatively small number of television shopping channels because of barriers to entry into the market while the number of LSBs hosted on e-commerce platforms is effectively unlimited. As of August 2016, over 1,000 Wanghongs were broadcasting from the Taobao e-commerce platform (Wu, 2017). Most recommendation systems use a delayed learning approach (Schafe et al., 2001) while LSB celebrities can respond to viewers' requests in real time. <Table 1> shows a comparison of the features of following three shopping channels (See <Table 1>).

2.2. Para-social Interactions Theory

PSIs give audiences the illusion of communicating face-to-face with celebrities (Horton and Wohl, 1956), causing people to feel like they know celebrities personally without having any actual relationship with them. The degree to which people share tastes and preferences with celebrities and the degree to which they engage in para-social relationships are positively correlated (Yoo, 2016). Social media platforms, such as Facebook and Twitter, have become valuable tools for enhancing the relationships between celebrities and their fans (Ballantine et al., 2005). However, many firms have yet to leverage this intimacy to drive sales. Thus, it is logical for e-commerce companies to incorporate LSBs into their e-commerce platforms. These systems offer a wide range of possible PSIs. They support social media technologies, including instant chatting, direct messaging and LSBs. These functions help customers to enter into para-social relationships with celebrities (Labrecque, 2014).

<Table 1> Comparison of Shopping Channels

	Television shopping programs	Recommendation systems	LSBs
Interactive	X	X	O
Immediate	X	X	O
Channel expandability	X	O	O

2.3. Attractiveness Theory

There is extensive support for the conclusion that a person's interpersonal attractiveness is positively correlated with the impact that they have on others (McCroskey et al., 2006). Interpersonal attractiveness is defined as, "judgments about whether we 'like' another person, whether we 'feel good' in his/her presence, etc." (McCroskey and McCain, 1974). Interpersonal attractiveness is comprised of social, task, and physical attractions. Interpersonal attractiveness affects the attitudes of others (Lydon et al., 1988; Montoya and Horton, 2004).

Social attraction is the ability to integrate into new social groups (McCroskey and McCain, 1974). It is generally manifested as being talkative, fun, and pleasant to be around. Task attraction is the ability to help others complete their tasks (McCroskey and McCain, 1974). Task attraction is manifested as being able to help people find what they need. In the e-commerce context, task attraction may explain why LSB celebrities can be correlated with purchasing decisions of viewers. Physical attraction is having attractive physical attributes. It is manifested as having culturally appropriate features, such as height and body shape (McCroskey and McCain, 1974). Wanghongs drive sales by influencing viewers' purchasing decisions by recommending products and responding to requests about specific products. Interpersonal attraction causes customers to strengthen their para-social relationships, making them more likely to respond to celebrities' product recommendations, which in turns leads to increased product sales.

2.4. Features of Online Relationships and Shopping Tasks

People can develop various interpersonal relationships online. The factors that affect the attractiveness of interpersonal relationships in the real world can also be applied to those that take place online (Shen et al., 2010). Certain features of LSB platforms may have a positive relationship with the social attraction of Wanghongs. For example, LSB viewers might develop impressions and make judgments about Wanghongs based on their profiles and awards that they have received, both of which are common features of LSB platforms.

Features of shopping tasks are "all the site descriptors which facilitate and enable the consumer's shopping goal attainment," (Eroglu et al., 2001). These features include product descriptions and navigation assistants. Consumers can purchase products by acquiring information from posts and LSBs about products. These features may impact on task attraction of Wanghongs. In the e-commerce context, LSB features are defined as influencing either social or task attraction (See <Table 2>).

Relationship Rewards

Previous researches have shown that one of the early stages of the multistage relationship process is forming attractiveness (Levinger, 1980). In the

<Table 2> Features of Wanghongs' LSBs that Influence their Social and Task Attraction

Social Attraction	Task Attraction
Relationship rewards Self-disclosure Affective interactivity	Informative interactivity Amount of information provided

e-commerce literature, this initial stage is related to relationship rewards (Siau and Shen, 2003). When someone receives a reward from someone else, they feel positively towards that person, so perceived rewards are an antecedent to attraction (Aronson and Linder, 1965). Most people like those who reward or compensate them (Myers, 2010). In addition, when people get the maximum reward at the least cost, they feel the attractiveness of the other party greatly. According to the social exchange theory, perceived rewards can affect early attractiveness in interpersonal relationships (Hogg and Vaughan, 2002). On LSB platform, the rewards offered by Wanghongs to gain favour of their followers are positively associated with their social attraction. For example, Wanghongs distribute lotteries in the form of 1) sponsored products, 2) voucher for the next purchase, and 3) Hongbao, which is actual cash reward, to their viewers. Lotteries are drawn by randomly selecting winners among followers. Because the winners already have favourable attitudes to Wanghongs, they may regard these products as pleasant gifts. Therefore, such lotteries may even strengthen the para-social relationship that the viewers have with Wanghongs, making Wanghongs more attractive to their viewers.

Self-disclosure

The personal information disclosure to others is important in all types of social relationships (Greene et al., 2006). Self-disclosure is the revelation of, "one's thoughts, feelings, or past experiences to another person..." It plays a major role in intimate relationships (Derlega, 1987). Social media broadcasts or posts about personal information are self-disclosure (Chai, 2011; Lin et al., 2016). Self-disclosure affects the likelihood that the people involved in the disclosure will interact again and so strengthen their relationships (Derlega et al., 2008). People show oth-

ers who they are and what they need through self-disclosure (Derlega, 1987). Past studies have shown that self-disclosure usually has two aspects: the breadth of disclosure (i.e., the amount of self-related disclosure) and depth of disclosure (i.e., the intimacy level of disclosure) (Altman and Taylor, 1973; Lin and Utz, 2017). The recipients' reactions to the disclosed information determine the effects of the self-disclosure (Ajzen, 1977). In addition, when disclosed information is perceived as appropriate, recipients can feel a greater preference for information providers (Collins and Miller, 1994). Attractive personal information can increase intimacy and help to maintain relationships (Derlega et al., 1993). Therefore, Wanghongs' social attraction may be associated with self-disclosure. In LSB context, Wanghongs can disclose their personal information through live profile and their broadcast. Live profile refers to a Wanghong's personal profile demonstrated if viewers click on the button next to the name of Wanghong. It provides information about the channel before the LSB.

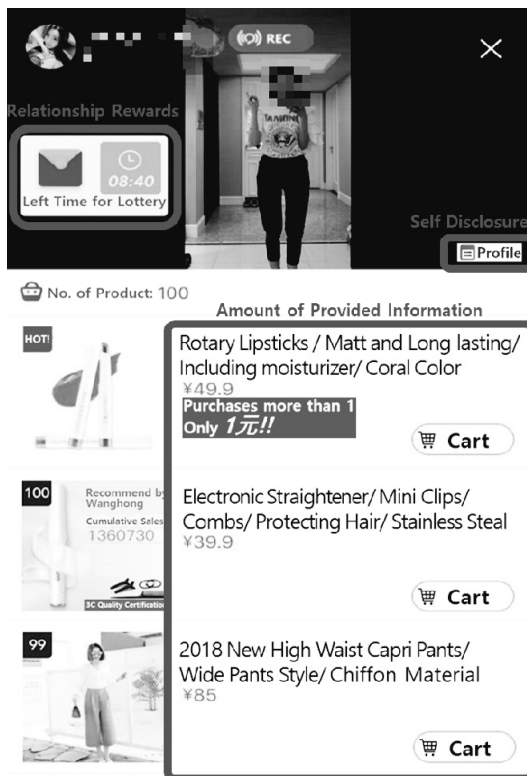### Affective and Informative Interactivity

People develop relationships by interacting with each other. Ni et al. (2007) categorized studies related to web blogs as affective and informative articles. According to the study, diaries containing personal information and descriptions with personal feelings are recognized as affective articles, whereas objective comments, knowledge and technical descriptions are identified as informative articles (Ni et al., 2007). In the same vein, our research attempts to find out the relationship between perceived attractiveness of Wanghongs and their affective and informative characteristics. Interaction is measured by extent to which people affectively and informatively engage with another person (Burgoon et al., 1999). In other

words, the degree to which people like someone and the degree to which that person is affectionate and the quantity of information that that person has are positively correlated. Perceived interactions are strongly correlated with attitude towards attraction (Jee and Lee, 2002). E-commerce platforms that host LSBs provide a variety of tools to encourage social interactions between LSB celebrities and their viewers. For example, Wanghongs can cultivate personal friendships with viewers and offer product information to them through LSBs, instant chatting, and direct messages provided by platforms. Instant chatting allows Wanghongs to reply to viewers' questions about products during LSB. This process may be associated with informative attraction. Moreover, Wanghongs may have close conversations with the followers through direct messages, and the followers may feel intimacy with Wanghongs after receiving such messages. With these tools, Wanghongs can engage in both affective and informative interactivity with their viewers. They are able to provide more targeted, timely, and personal information than traditional e-commerce platforms.

Amount of Information Provided

Consumers value information when making purchase decisions. The amount of information that consumers receive is negatively correlated with the perceived risk of the purchase and positively correlated with the intent to make a purchase (Kim and Lennon, 2000). People with high demand for product information need more and various information

<Figure 1.a> Main LSB Page

<Figure 1.b> LSB Page

(Kuruzovich et al., 2008). As consumers gets more information about products, their expectations become more realistic, reducing the rate at which they return products (De et al., 2013). In addition, amount of fit-to-task information is positively correlated with amount of online shopping (Loiacono et al., 2007) and price sensitivity is reduced when information about product quality is provided (Lynch and Ariely, 2000). Product information is fit-to-task information in the context of online shopping. When Wanghongs provide product information to their viewers, they reduce their viewers' product uncertainty and increase their viewers' trust in them. Wanghongs often provide lists of other products that they recommend besides the products featured in their broadcasts. The list of recommendation by Wanghongs can remind viewers about what their needs. In addition, the list has width of information, thus allowing users to gain wide information about products. The list provides core information about product type, price, and specific features of the product.
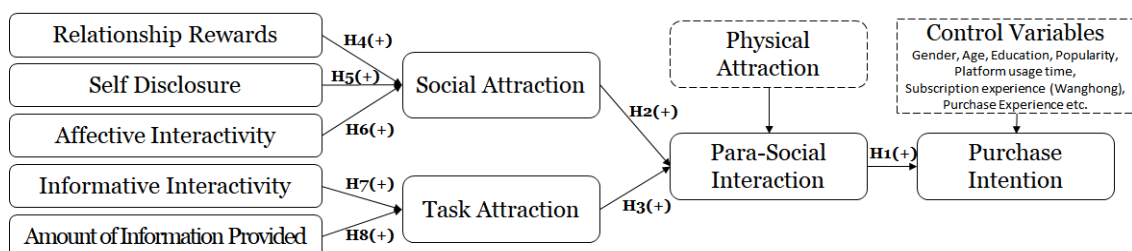
Taobao developed its e-commerce platform to most strongly leverage these five ways that Wanghongs become attractive to viewers through LSBs. In <Figure 1.a>, Taobao's LSB screens contain relationship reward information, Wanghongs' self-disclosures, and the amount of information provided by Wanghongs. Users can easily switch between functions from the main LSB page. Wanghongs can engage in affective

and informative interactivity through instant chatting during LSBs (See <Figure 1.b>).

Ⅲ. Research Model and Hypothesis Development

Para-social relationships have been shown to encourage consumers to make purchases (Park et al., 2006). The strength of para-social relationships is based on several dimensions. Wanghongs can increase their attractiveness using different functions available on their LSB platforms. This study defined relationship rewards, self-disclosure, affective interactivity, informative interactivity, and the amount of information provided as the major determinants of social and task attraction. This study did not consider physical attraction because the five factors that were ultimately used do not affect a person's appearance. The research model was built to reflect the foundations and results of para-social relationships (See <Figure 2>).

Consumers who interact more with other shoppers have stronger intentions to make purchases (Joines et al., 2003). Stronger para-social relationships can result in stronger intentions to make purchases. Television shopping program viewers have been shown to enter into Para-social relationships with the programs' hosts, which induced shopping behav-

<Figure 2> Research Model

iours (Park et al., 2006). Para-social relationships are more likely to form in the LSB e-commerce context than in the context of traditional media because LSB e-commerce platform users are able to communicate more often and more interactively with Wanghongs in real time than they are with traditional media celebrities. LSB e-commerce platforms provide instant chatting services between internet celebrities and their viewers which likely strengthen para-social relationships (Hu et al., 2017). Therefore, it was hypothesized that:

H1: *The strength of the para-social relationships that viewers form with Wanghongs in the LSB e-commerce context is positively correlated with the strength of purchase intentions*

The attractiveness theory holds that one person's attractiveness can influence the behaviours of others (Berger and Calabrese, 1974). Several studies have found that social, task, and physical attraction can strengthen para-social relationships between celebrities and their fans (Berscheid et al., 1989; Rubin and McHugh, 1987). In the context of television shopping, customers enter into para-social relationships with celebrities when they feel that the celebrities are their friends due to their social attraction or when the celebrities help them to choose which products to buy due to their task attraction (Rubin and McHugh, 1987). It was expected the strength of para-social relationships in the LSB e-commerce context would be positively associated with celebrities' social and task attraction. This expectation led to the following hypotheses:

H2: *Wanghongs' social attraction is positively correlated with the strength of the para-social relationships they have with their viewers.*

H3: *Wanghongs' task attraction is positively correlated with the strength of the para-social relationships they have with their viewers.*

People are more attracted to those who give them rewards than to those who do not (Hogg and Vaughan, 2002). People want relationships in which the benefits outweigh the costs to continue (Myers, 2010). Wanghongs regularly distribute vouchers, virtual currencies, and lottery prizes via e-commerce platforms to their viewers as rewards. The expectation of receiving a reward has been found to be the antecedent of attraction (Riordan et al., 1982). Thus, the rewards that Wanghongs give to their viewers have relationship with their attractiveness. Therefore, it was hypothesized that:

H4: *The number of the relationship rewards provided by Wanghongs is positively correlated with their social attraction.*

Studies have shown that the volume of self-disclosures does not affect social attraction, but the intimacy of the information contained in them does (Lin and Utz, 2017; Sheldon, 2009). Wanghongs can use their profiles on LSB platforms to engage in self-disclosure which is associated with the level of intimacy that their viewers feel with them. Thus, the following hypothesis was posited:

H5: *The intimacy of the self-disclosures in Wanghongs' profiles is positively correlated with their social attraction.*

Blog entries are either affective or informative. Affective entries include expressions of personal feelings, such as diaries, whereas informative entries include objective information or knowledge (Ni et al.,

2007). Wanghongs' LSBs can be similarly categorized. Wanghongs produce both affective and informative content to interact with their viewers. Affective contents were expected to be positively correlated with Wanghongs' social attraction because such contents have a relationship with intimacy to Wanghongs. Informative contents were expected to be positively correlated with Wanghong task attraction because purchase decisions are associated with such contents. As mentioned earlier, Wanghongs can communicate intimately with and address the questions to customers through an instant chat tool as well as broadcasts. With this tool, Wanghongs could conduct both affective and informative interactivities with users. Therefore it was hypothesized that:

H6: *Wanghongs' affective interactivity is positively correlated with their social attraction.*

H7: *Wanghongs' informative interactivity is positively correlated with their task attraction.*

The availability of fit-to-task information helps customers shop conveniently and efficiently. Customers need more information when deciding about which experience goods and some customers require more information due to personal preferences (Kuruzovich, 2008). LSB e-commerce platforms deliver product information in various ways. Wanghongs can access detailed information about products, such as prices and ingredients. Consumers can check product lists created by Wanghongs during their LSBs. These activities are distinct from informative interactivity. Thus it was hypothesized that:

H8: *The amount of information provided by Wanghongs is positively correlated with their task attraction.*

IV. Research Methodology

4.1. Research Context

This study's research model was tested using survey data. The subjects of the survey were people who had viewed LSBs on Taobao, the largest e-commerce company in China. Some social media platforms, such as Facebook, host LSBs to drive product sales, but often they are inconvenient for shopping because they do not provide customers with shopping support functions. Taobao does, so it was decided to be the most suitable platform for studying the impact that LSBs have on viewers' purchase intentions. Existing measurement items were applied with minor changes to make them suitable for the context of this study. Control variables, demographic variables, and metrics for measuring experiences with the platform, Wanghongs, and e-commerce experiences were adopted from previous studies (McCroskey and McCain, 1974; Peck and Wiggins, 2006; Thorson and Rodgers, 2006). Physical attraction was set as a control variable because it did not depend on features of e-commerce platforms but did influence viewer purchase intentions. Two pilot tests were conducted to ensure that the metrics were reliable and valid.

4.2. Data Collection

Subjects were surveyed online for six days from November 7 to November 13, 2017. The subject population was users of QQ group, the most popular chatting website in China. Before responding to the survey, in order to screen out unsuitable respondents, potential subjects were asked whether they had used the Taobao Live broadcasting service, whether they knew any Taobao Live broadcasting service

Wanghongs, and whether they had purchased products reviewed by Wanghongs. Only respondents who answered affirmatively to the first two questions were ultimately surveyed. Survey respondents were given RMB 10 (USD 2) for completing the survey. A total of 190 complete surveys were received. The measurement model was examined using Smart PLS 2.0. Construct reliability and validity were acceptable based on commonly used criteria (Fornell and Larcker, 1981). <Table 3> summarizes the respondents' characteristics.

Of the 190 respondents, 77.9% were female and

<Table 3> Descriptive Statistics of Respondents

Category	Sub-category	Frequency	Percentage
Gender	Male	42	22.1
	Female	148	77.9
Age	Under 25	138	72.6
	25 – 35	48	25.3
	35 – 45	4	2.1
	Over 45	0	0.0
Highest education level	High school or below	12	6.3
	College	40	21.1
	Bachelor	120	63.2
	Master	18	9.5
	Doctorate	0	0.0
How the platform was accessed	Mobile phone	146	76.8
	Tablet	44	23.2
Monthly shopping expenditures (USD)	Under 50	18	9.5
	50 – 100	58	39.5
	100 – 150	50	26.3
	150 – 200	37	19.5
	Over 200	27	14.2
Number of subscribers (1,000)	Under 250	118	62.1
	250 – 500	30	15.8
	500 – 750	6	3.1
	750 – 1,000	7	3.7
	Over 1,000	29	15.3
Platform usage duration (months)	Under 3	45	23.7
	3 – 6	37	19.5
	6 – 9	27	14.2
	9 – 12	28	14.7
	Over 12	53	27.9
Subscription period	Under 3	60	31.6
	3 – 6	64	33.7
	6 – 9	28	14.7
	9 – 12	19	10.0
	Over 12	19	10.0
Number of purchases made on Taobao	0	36	19.0
	1 – 3	57	30.0
	4 – 6	49	25.8
	7 – 9	20	10.5
	Over 10	28	14.7

22.1% male. The respondents were relatively young, with 72.6% under 25 years old and 95% under 35 years old. The respondents were generally well educated. They mainly spent USD 50–150 per month on shopping. A total of 76.8% of respondents used mobile phones to watch LSBs. Most respondents had either used Taobao for less than 3 months or more than 1 year. All metrics were multiple item scales verified by previous studies with minor mod-

ifications to ensure contextual consistency. All items asked users to give an answer on a 7-point Likert scale with 1 meaning "completely disagree" and 7 meaning "completely agree". The survey was written in Chinese, so the translation-back-translation method was used to ensure that the respondents and researchers had a consistent understanding of the survey content.

<Table 4> Reliability and Convergent Validity Measurement

Construct	Item	Cross Loading	t-value	Average extracted variance	Composite reliability	Cronbach's a
Perceived Relationship Reward	RR1	0.858	31.503	0.644	0.843	0.720
	RR2	0.704	11.091			
	RR3	0.836	34.891			
Self-Disclosure	SD2	0.730	2.965	0.729	0.914	0.932
	SD3	0.810	3.438			
	SD4	0.882	3.221			
	SD5	0.974	3.129			
Perceived Affective Interactivity	AF1	0.784	27.123	0.675	0.861	0.759
	AF2	0.818	27.859			
	AF3	0.861	40.954			
Perceived Informative Interactivity	IF1	0.842	36.533	0.636	0.839	0.713
	IF2	0.752	25.476			
	IF3	0.796	24.475			
Amount of Information Provided	AI1	0.820	20.324	0.673	0.861	0.760
	AI3	0.814	22.551			
	AI4	0.827	39.345			
Social Attraction	SA1	0.876	59.854	0.713	0.908	0.865
	SA2	0.805	29.211			
	SA3	0.835	28.784			
	SA4	0.859	28.784			
Task Attraction	TA1	0.855	46.313	0.715	0.914	0.801
	TA2	0.831	36.558			
	TA4	0.849	26.863			
PSI (Para-Social Interaction)	PSI1	0.748	17.986	0.582	0.847	0.760
	PSI3	0.808	25.533			
	PSI4	0.756	26.005			
	PSI5	0.737	15.206			
Purchase Intention	PI1	0.893	56.534	0.707	0.906	0.862
	PI2	0.809	24.887			
	PI3	0.831	31.150			
	PI4	0.828	33.019			

Ⅴ. Data Analysis and Results

5.1. Factors Analysis

The measurement model was examined using Smart PLS 2.0. Model reliability and validity were determined to be acceptable based on commonly used criteria (Fornell and Larcker, 1981). Items with cross-loading values less than 0.7 were removed. 5 out of 40 items are deleted and all items of the questionnaire including dropped items are shown in Appendix. The reliability, convergent validity, and discriminant validity of the measurement model were calculated. Reliability measures were assessed using Cronbach's alpha, composite reliability, and average variance extraction (Hair et al., 1998). Convergent validity is high among metrics for the same attribute. Convergent validity was secured in this study. All constructs in this study were reflective. Therefore, in addition to examining the composite reliability and average variance extraction values, the convergence validity was tested by determining whether the loading values for the corresponding constructs were relatively high. <Table 4> shows the loading, average variance extraction, composite reliability, and Cronbach's alpha values for construct items.

Discriminant validity is the extent to which one construct's metric differs from those for other constructs. Discriminant validity and correlation should be negatively related. The construct which the square root of the average variance extraction should be larger than the correlation values of other constructs. All variables satisfied the condition, indicating that discriminant validity was secured (See <Table 5>).

This study surveyed the same respondents, so common method bias may have arisen between the independent and dependent variables. Harman's one-factor analysis indicated that 71% of the total variance was explained and the factor that explained the greatest amount of the variance accounted for 40% (Podsakoff et al., 2003). Therefore, it was concluded that the common method bias did not arise in this study.

5.2. Main Results

The partial least squares method was used to test the research hypotheses (Chin et al., 1988; Wold, 1989). <Figure 3> shows the overall explanatory pow-

<Table 5> Discriminant Validity Measurement

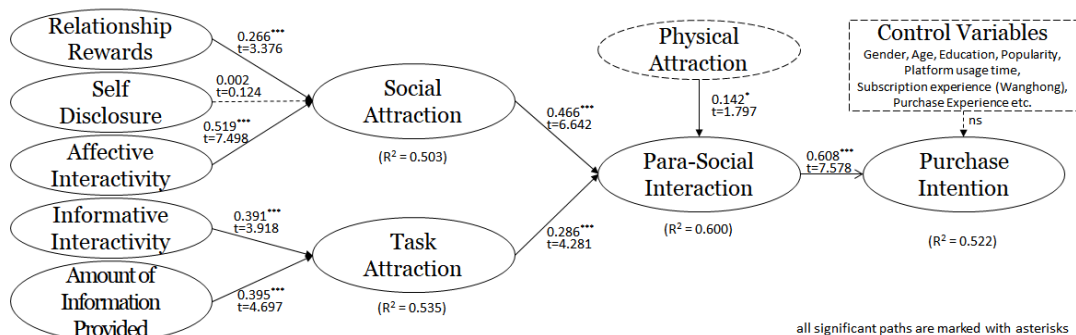|	RR	SD	AF	IF	AI	SA	TA	PSI	PI
RR	0.802								
SD	0.110	0.854							
AF	0.587	0.178	0.822						
IF	0.645	0.163	0.753	0.797					
AI	0.676	0.168	0.651	0.732	0.820				
SA	0.571	0.124	0.676	0.635	0.625	0.844			
TA	0.530	0.081	0.630	0.680	0.681	0.653	0.845		
PSI	0.640	0.178	0.660	0.701	0.677	0.729	0.652	0.763	
PI	0.560	0.121	0.548	0.629	0.584	0.516	0.545	0.663	0.841

Note: RR = perceived relationship reward; SD = self-disclosure; AF = perceived affective interactivity; IF = perceived informative interactivity; AI = amount of information provided; SA = social attraction; TA = task attraction; PSI = para-social interaction; PI = purchase intention

er, estimated coefficient, research model results, and t-values for each path. The overall explanatory power of the model was almost 50%. All of the hypotheses were supported except H5 at $p < 0.01$. Relationship rewards and affective interactivity significantly affected social attraction with path coefficients of 0.266 and 0.519, respectively, supporting H4 and H6. The reward that Wanghongs pay to the viewers for the relationship has a positive relationship with Wanghongs' social attraction. In addition, the affective interactivity has a positive relationship with social attraction. We believe that the affective interactivity through LSBs allows viewers to recognize that Wanghongs care about audiences and try to develop relationship. There is no relationship between self-disclosure and social attraction. In PSIs context, offering personal information to public does not have effect on strengthening social relationship. The intimacy of self-disclosures on social network platforms indicated that private messages have a stronger positive effect than public messages (Bazarova, 2012). LSB viewers may not be sensitive to Wanghongs' public profile updates. Informative interactivity and amount of information provided influenced task attraction with path coefficients of 0.391 and 0.395, respectively, supporting H7 and H8. It is more likely

that the information is suitable for the viewers' task (i.e., online shopping) when the informative interactivity or the amount of information provided by Wanghong is high. Social and task attraction also are strongly associated with PSI with path coefficients of 0.466 and 0.286, respectively. The results support H2 and H3. These findings reveal that Wanghongs' social attraction ($\beta = 0.466$, $t = 6.642$) and task attraction ($\beta = 0.286$, $t = 4.281$) were positively related with para-social relationship strength. That is, both attractions could tie the relationship between customers and internet celebrities. PSIs significantly accounts for purchase intention with a path coefficient of 0.54, supporting H1. Number of PSIs ($\beta = 0.608$, $t = 7.578$) was positively correlated with purchase intention strength. The only physical attraction ($\beta = 0.142$, $p < 0.1$) and subscription period ($\beta = 0.161$, $p < 0.1$) of our control variables were significant.

5.3. Robustness Checks

We conducted further research to consider compounding path among our variables. The amount of information provided has a potential to influence the social attraction. If customers recognize that the information provided by a specific Wanghong is ap-
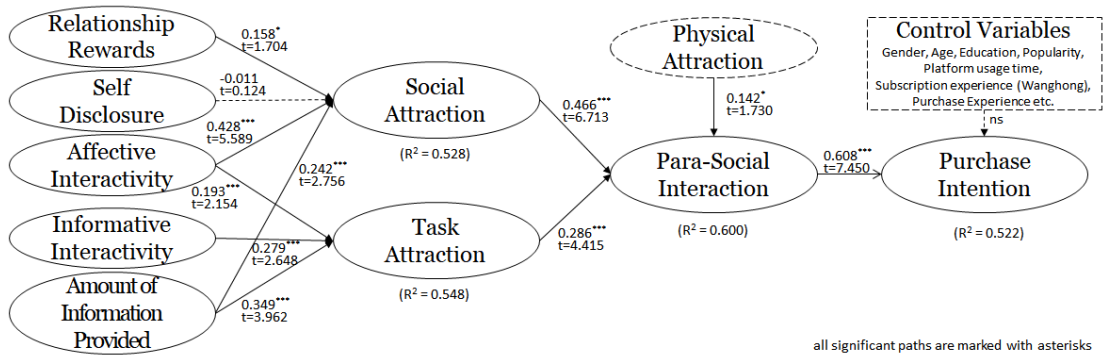

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, ns: insignificant at the 0.05 level

<Figure 3> Structural Model Testing Results

propriate for the information they are looking for, then they could perceived that the Wanghong takes care of them. It could induce social attraction of Wanghong. Therefore, we linked between the amount of information provided by Wanghong and social attraction. We also considered the effect of affective interactivity on task attraction. Strong affective interactivity between Wanghong and the customer can be positively correlated with customers' tasks. Based on this possibility, we established a new model (See <Figure 4>). The results of the additional research model showed that affective interactivity has a positive relationship with task attraction with a path
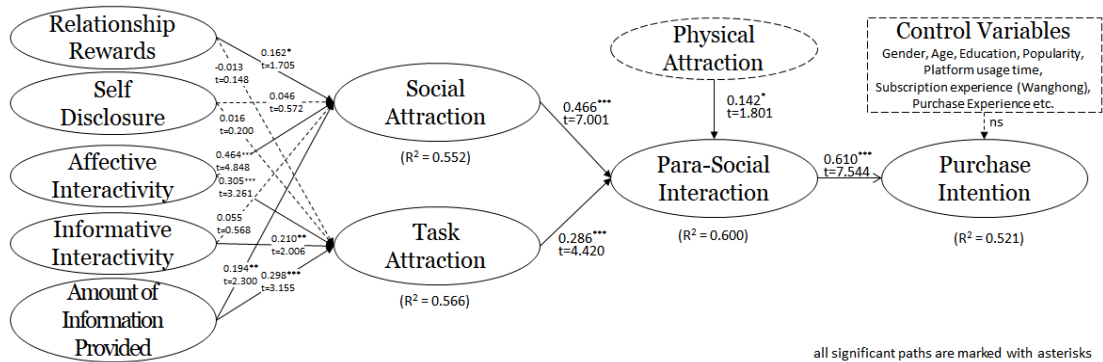
coefficient of 0.193 (t = 2.154) and amount of information provided influenced social attraction with a path coefficient of 0.242 (t = 2.756). The path coefficient of relationship rewards was much smaller in the additional model than the structural model.

We further tested all possible relationships among all constructs by adding paths between social and task attraction and five antecedents (See <Figure 5>). The results of the second alternative model were all insignificant other than the paths we were concerned with. However, the coefficients of the two modified paths (i.e., the link between affective interactivity and task attraction and the link between

Note: * p < 0.05, ** p < 0.01, *** p < 0.001, ns: insignificant at the 0.05 level

<Figure 4> Additional Model Analysis Results (1)

Note: * p < 0.05, ** p < 0.01, *** p < 0.001, ns: insignificant at the 0.05 level

<Figure 5> Additional Model Analysis Results (2)

amount of information provided and social attraction) were significant, suggesting that affective interactivity is not only associated with close relationship with Wanghong, but also with customers' perceived information of products. That is, customers who consider themselves close to a specific Wanghong may feel that the product information provided by the Wanghong is more accurate and appropriate for them. Besides, products preferred by customers may be included in the large amount of information provided. The Customer may have a higher social attraction to Wanghong who recommends products that suit his/her taste. Therefore, there could be a positive relationship between the amount of information provided and social attraction.

Ⅵ. Discussion and Implications

6.1. General Discussion

Wanghongs mainly communicate with their viewers and increase their viewers' purchase intentions through LSBs, creating PSIs. Drawing on PSI theory and attractiveness theory perspectives, this study examined which factors affected social and task attraction of Wanghongs. Relationship rewards, self-disclosures, affective interactivity, informative interactivity, and the amount of information provided were positively correlated with the strength of para-social relationships and purchase intention. More specifically, relationship rewards and affective interactivity were the key determinants of social attraction. Informative interactivity and the amount of information provided significantly influenced task attraction. Social and task attraction positively influenced the strength of para-social relationships. These results were consistent with studies on offline para-so-

cial relationships (Rubin and McHugh, 1987). Wanghongs' social and task attraction positively influenced the strength of para-social relationships developed through LSBs which in turn positively influenced viewers' purchase intentions. In the additional analysis, we thought that the reason why affective interactivity influencing task attraction is that it can increase the reliability of Wanghong while watching the broadcast. And because the amount of information was provided by Wanghong includes some social aspect behaviour, so amount of provided information affects social attraction. All of these findings provide important insights for both researchers and LSB platform designers.

6.2. Theoretical Implications

This study made various contributions to the on e-commerce and PSI literatures. First, this study extended PSI research to online shopping, especially to LSB context. As a new form of electronic commerce, LSBs have received little attention from researchers until recently. Rubin and McHugh (1987) found that social and task attraction influenced PSIs offline. This study showed that the attractiveness theory and PSI theory can be applied in this new online context. Second, this study developed five antecedents — perceived relationship rewards, self-disclosure, affective/informative interactivity and amount of information provided — that are associated with para-social relationships. Such antecedents reflect unique IT artefact in the LSB context. Little empirical research on the functional role of LSBs has been conducted. This study developed and tested the validity of a conceptual model to help fill this research gap. Third, this study emphasized the influence of PSIs on purchase intentions in the context of LSBs. In spite of the impact of LSBs on

customers' purchase, the literature has paid little attention to the novel platform in online shopping. This study showed that viewers form para-social relationships with Wanghongs through LSBs.

6.3. Practical Implications

The results of this study can be used to develop guidelines for LSB platform designers and Wanghongs. LSB platform designers should design platform features to enhance the attractiveness of Wanghongs to users. First, social attraction was found to have stronger correlation with the para-social interaction than the task attraction. Therefore, among the five antecedents, relationship rewards and affective interactivity should be increased in order to enhance social attraction. It is most effective for high purchase intention that Wanghongs give monetary rewards to views or have live chat on the air. Second, designers can increase user attraction to Wanghongs by improving LSBs' social-related and task-related functions. As found in this study, the key determinant of users' decision to make purchases through e-commerce platforms after viewing LSBs depends on the strength of their para-social relationships with Wanghongs. For example, designers could provide a function through which Wanghongs can reward viewers with items. Designers could also increase Wanghongs' ability to provide product information to viewers. Wanghongs should make good use of these tools to enhance their attractiveness. Lastly, the path coefficient of physical attraction is lower than social attraction and task attraction. The physical attraction is positively associated with para-social interaction as well, but developing social and task attraction is more effective in enhancing para-social interaction. Wanghongs can increase their physical attraction with some attractive objects (Lee, 2014).

However, it is better to enhance social attraction by giving viewers gifts or to increase task attraction by providing more specific information through live chat. In addition, e-commerce companies could increase sales by leveraging Wanghongs' influence over their customers. This study's results suggested that Wanghongs could increase the influence that they have on their viewers by enhancing their social and task attraction through LSBs.

6.4. Limitations and Future Research Directions

This study has several limitations that suggest directions for future research. This study only used cross-sectional data to test causal relationships, so stronger longitudinal studies should be conducted to provide stronger evidence of causality. Longitudinal studies and experiments can provide strong inferences of causality and improve understanding of the direction of causality (Dillon and Goldstein, 1984). However, given limited time and resources, cross-sectional studies can be used as an exploratory means to determine interesting relationships. Future study using this theoretical model may adopt a longitudinal approach to investigate the direction of causality and its impact on the formation of PSIs. There may be different links between key variables. However, the explanatory power of the model in this study was sufficiently high. We could alleviate this concern because the explanatory power of our main model in this study is more than 50%. Finally, since this study carried out in Chinese online market, the possibility of generalization of the results may be limited. The research model and the conclusions need to be carefully applied in different cultural contexts.

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<Appendix> Measurement Items

Construct	Item	Wording	Reference
Perceived Relationship Rewards	RR1	Watching the broadcast from the Wanghong would be a rewarding experience (e.g. gift certificates, virtual currency, lotteries).	Campbell et al. (2013)
	RR2	Others most likely find watching the broadcast from the Wanghong would be a rewarding experience (e.g. gift certificates, virtual currency, lotteries) as well.	
	RR3	I feel that there are more positive consequences (e.g. gift certificates, virtual currency, lotteries) than negative in watching the broadcast from the Wanghong.	
Self Disclosure	SD1*	The Wanghong discloses who he/she really is, openly and fully in his/her live profile.	Wheeless (1978) Parks and Floyd (1996)
	SD2	The Wanghong discloses how he/she feels.	
	SD3	Once Wanghong starts self-disclosure, it lasts a long time.	
	SD4	The Wanghong discloses intimate, personal information about himself/herself without hesitation.	
	SD5	Once Wanghong starts self-disclosure, he/she fully reveals himself/herself in his/her live profile.	
Perceived Affective Interactivity	AF1	I feel a sense of interest in the Wanghong through the interaction in the broadcast.	Peck and Wiggins (2006)
	AF2	I feel a sense of intimacy with the Wanghong through the interaction in the broadcast.	
	AF3	I have a sense of enjoyment in the Wanghong through the interaction in the broadcast.	
Perceived Informative Interactivity	IF1	The information shown when I interacted with the Wanghong was appropriate.	Cyr et al. (2009) Lee and Hong (2016)
	IF2	The information shown when I interacted with the Wanghong was suitable.	
	IF3	The information shown when I interacted with the Wanghong was useful.	
Amount of information provided	AI1	The recommendation list from the Wanghong I viewed contained very much information.	Kim and Lennon (2000)
	AI2*	From the recommendation list from the Wanghong, I learned a great deal about the product.	
	AI3	After watching the recommendation list from the Wanghong, I know enough to make an informed purchase decision.	
	AI4	I can fully trust the recommendation list from the Wanghong.	
Social Attraction	SA1	I think the Wanghong could be a friend of mine.	McRoskey and McCain (1974)
	SA2	I would like to have a friendly chat with the Wanghong.	
	SA3	I feel I know the Wanghong personally.	
	SA4	The Wanghong would be pleasant to be with.	
Task Attraction	TA1	I can trust the Wanghong's ability when getting the purchase done.	McRoskey and McCain (1974)
	TA2	If I wanted to get purchase done I could probably depend on the Wanghong.	
	TA3*	The Wanghong would be a poor problem solver.	
	TA4	I could count on the Wanghong getting a purchase done.	

<Appendix> Measurement Items (Cont.)

Construct	Item	Wording	Reference
Physical Attraction	PA1	I think the Wanghong is quite handsome/pretty.	McRoskey and McCain (1974)
	PA2	The Wanghong is sexy-looking.	
	PA3	The Wanghong is well groomed.	
	PA4	I find the Wanghong very attractive physically.	
Para-Social Interaction	PSI1	I enjoy listening to the Wanghong's voice.	Thorson and Rodgers (2006) Kim et al. (2016)
	PSI2*	I am familiar with the Wanghong.	
	PSI3	I feel like the Wanghong is an old friend.	
	PSI4	I can trust the information I get from the Wanghong.	
	PSI5	I would tell my friends about the Wanghong.	
	PSI6*	I would like to read the article if a newspaper or magazine has a story about the Wanghong.	
Purchase Intention	PI1	I will definitely buy products from the Wanghong in the near future.	Hausman and Siekpe (2009)
	PI2	I intend to purchase through the Wanghong in the near future.	
	PI3	It is likely that I will purchase through the Wanghong in the near future.	
	PI4	I expect to purchase through the Wanghong in the near future.	

* Dropped after the exploratory factor analysis

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