Examining the moderating effect of perceived value on continuous intention to use mobile instant messaging service

모바일 메신저의 지속사용 의도에 관한 연구 : 지각된 가치의 조절효과를 중심으로

Examining the moderating effect of perceived value on continuous intention to use mobile instant messaging service

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··· Abstract ···

With the fast development and wide spread adoption of mobile instant messaging (MIM) service, determining which factors significantly impact customer's continuance intention is very important for MIM providers. To better understand this phenomenon, in this study, we have integrated the construct of interaction and network externalities as independent variables. Interaction includes application interaction and social interaction; meanwhile, Network externalities include direct externalities (referent network size) and indirect externalities (perceived complementarity). The results of this study show that all these independent variables have a significant influence on overall customer satisfaction. Furthermore, from the perspective of network externalities, perceived complementarity is the only antecedent that has an impact on perceived value. Finally, the moderating effect of perceived value on the relationship between satisfaction and continuance intention is verified in this study. When perceived value is high, even low satisfied customers are more likely to continue using MIM service than high satisfied customers, who have low perceived value.

Key Words : mobile instant messaging service(MIM); continuance intention; satisfaction; perceived value' interaction; network externalities

Ⅰ. Introduction

A China Internet Network Information Center(CNNIC) report shows that until the end of June 2013, the scale of the mobile Internet users in China has reached 464 million, accounting for 78.5% of the entire Internet users in China(591 million). Moreover, the scale of mobile instant messaging has occupied the first place among all kinds of mobile Internet services. Until the end of June 2013, the scale of mobile instant messaging has reached 397 million, accounting for 85.6% of the entire mobile Internet users. The fast development of MIM service brings the MIM providers with the unprecedented opportunities and challenges. Considering the serious homogeneity and low switching cost of MIM service, a comprehensive understanding of customers' usage behavior is very important for both the existing MIM providers and the new entrants.

The main purpose of this study is to theoretically propose and empirically validate a research model to identify the effects of both network externalities and interaction on customers' continuance intention by considering the important role of satisfaction and perceived value on customer's behavior suggested by many previous studies(Barnes and Böhringer, 2011; Bhattacherjee, 2001; Kim et al., 2007; Wang and Wang, 2010). Satisfaction and perceived value are adopted as a mediator in this study. Furthermore, the moderating effect of perceived value on the relationship between satisfaction and continuance intention is also examined in this study.

Ⅱ. Research model and hypotheses

1. Satisfaction and continuance intention

The conceptualization of satisfaction as an evaluation of emotion has been accepted by many previous studies (Hunt, 1997). Rust and Oliver (1994) further suggested that customer satisfaction reflects the degree to which a consumer believes that the possession or use of a service evokes positive feelings. It's important to note that customer satisfaction can be defined using the transaction-specific perspective or cumulative-specific perspective. From the transaction-specific perspective, customer satisfaction is the evaluation based on their recent purchase experiences (Boulding, 1993). When satisfaction is seen as an emotional response to performance on specific attributes of a service, it is conceptualized as transaction-specific satisfaction. Alternatively, from the cumulative-specific perspective, customer satisfaction stresses overall evaluations, which should be based on the entire purchase experiences. When

satisfaction is more likely to depend on the factors that occur over repeated transactions, it is conceptualized as cumulative-specific perspective. Taking online shopping as an example, when a customer makes one-time purchase from a new online shop, customer satisfaction should be measured from the transaction-specific perspective; when a customer make s purchases repeatedly from the same online shop, customer satisfaction should be measured from the cumulative-specific perspective. Some scholars suggested that the cumulative-specific perspective is more capable of evaluating service performance of firms and more effective in predicting consumers' continuance behavior (Parasuraman et al., 1988; Wang et al., 2004). Hence, in this study, customer satisfaction is defined from the cumulative-specific perspective as the extent to which an individual perceives a positive affective state resulting from an overall evaluation of performance based on his/her past usage experience of MIM service, based on Bhattacharjee (2001)'s study.

The post-purchase intention is the tendency that consumers will purchase the goods or services from the same shop and deliver their usage experiences to friends and relatives (Cronin et al., 2000; Wang et al., 2004). In Zeithaml et al. (1996), they argued that higher level of satisfaction will lead to a stronger intention to repurchase and recommend the purchased product to their friends and relatives. It indicates that more frequent repurchase behavior can be induced when customer satisfaction is enhanced. Through ECM(expectation-confirmation model), Bhattacherjee (2001) suggested that satisfaction is positively related to continuance intention. Moreover, lots of previous studies have verified that satisfaction is a key factor to influence customer's continuance intention or repurchase intention (Barnes and Böhringer, 2011; Hong et al., 2006; Kim, 2010; Zhao and Lu, 2012; Zhou et al., 2014). In the context of MIM service, a similar line of reasoning can be considered, in which users' satisfaction with their usage of MIM service tends to reinforce their intention to continue using that service. Hence, it is reasonable for us to expect satisfaction may affect continuance intention in the context of MIM service. In this study, continuance intention is defined as the extent to which an individual is willing to continue using MIM service, based on Bhattacherjee (2001)'s study. Thus, Hypothesis 1 is proposed as follows.

H1: Satisfaction has a positive impact on continuance intention.

2. Perceived Value

Customer's perceived value can be defined from the perspectives of money, quality, benefit, and social psychology. From the monetary perspective, Bishop [6] indicated that perceived value could be generated when less money is paid for goods. Perceived value can be considered as the difference between the highest price that the customers are willing to pay and the price that the customers are paid. From the quality perspective, Bishop (1984) suggested that perceived value is the difference between the money paid for a certain product and the quality of the product. In other words, when less money is paid for a higher quality product, the positive perceived value can be generated. From the benefit perspective, Zeithaml (1988) pointed out that perceived value is customer's overall evaluation of the utility of perceived benefits and perceived sacrifices. That is, perceived value can be generated by integrating their perceptions of what they get and what they have to give up to obtain goods. From the psychology perspective, Sheth et al. (1991) indicated that perceived value mainly relies on the meaning of the purchase behavior to the buyer's social circle. That is, the purchase behavior should bring particular meanings to increase buyer's social self-concept (Wang et al., 2004). Considering the definition of perceived value from the benefit perspective is the most commonly used approach (Kim et al., 2007; Kuo et al., 2009; Lin et al., 2012), perceived value, in this study, is defined as the extent to which customers perceive the gains and losses relative to some natural reference point during the actual use of MIM service, based on Kuo et al. (2009)'s study.

Researchers have established a positive relationship between perceived value and adoption intention/continuance intention (Chiu et al., 2005; Kim et al., 2007; Kuo et al., 2009, Wang and Wang, 2010; Turel et al., 2007). When perceived value is low, customers will be more inclined to switch to available alternatives to increase perceived value which, in turn, will decrease customers' continuance intention, thus contributing to a decline in continuance behavior. In the context of e-business, even satisfied customers are unlikely to patronize an e-business, if they feel that they are not getting the best value for their money. Instead, they will seek out other sellers in an ongoing effort to find a better value (Anderson and Srinivasan, 2003; Chang, 2006). The relationship between customer satisfaction and their continuance intention appears strongest when the customers feel that their incumbent IT provides higher overall value than that offered by other available alternatives and appears weakest when the

customers feel that their incumbent IT provides lower overall value than that offered by other available alternatives (Chang et al., 2009). Therefore, it is reasonable for us to expect that there is a significant moderating effect of perceived value on the relationship between satisfaction and continuance intention. Thus, Hypothesis 2 is proposed as follows.

H2: Perceived value has a significant moderating effect on the relationship between satisfaction and continuance intention.

3. Network externalities

Katz and Shapiro (1985) defined the network externalities as "the value or effect that users can obtain a product or service that will bring about more value to customers with the increase of users, complementary product, or service." In Strader et al. (2007), they defined the network externalities as "user's utility increases with the number of users." Hence, once the user scale of a product/service reaches a critical number, more external benefits will be created and added to the original product/service to attract more potential users (Lin and Bhattacherjee, 2008). According to Katz and Shapiro (1985), network externalities

can be classified into two categories: direct externalities and indirect externalities. Direct externalities are usually associated with the user base and can be derived from the increase in the user base of a specific product/service, in which individual user's benefit also increases. For instance, when the user base of an online game platform increases, the individual user can play the online game with more peers. Indirect externalities are usually associated with the additional complementary products, services, and functions available to their users, accompanying with the increase of user base. For instance, considering the huge user base of Android Smartphone, the third-party software developers are more likely to release their applications or even exclusive applications on Android platform, which will benefit all Android Smartphone users. In contrast, due to the limited user base of Windows Phone, even some of the most-used applications on Android platform are absent on Windows Phone platform.

Following many previous studies (Lin and Bhattacherjee, 2008; Zhao and Lu, 2012), network externalities are measured using two factors in this study: referent network size and perceived complementarity. Referent network size, which represents direct network externalities, is defined as the number of people in a user's social circle that adopt

a specific MIM platform (Lin and Bhattacherjee, 2008). Perceived complementarity, which represents indirect network externalities, is defined as the complementary functions and additional services, which will bring them more values, can be acquired by their users as the user base expands (Strader, 2007). In the context of MIM service, from the perspective of referent network size, when referent network size is large, the individual user can communicate with more peers. Moreover, through the friend recommendation mechanism, a great number of peers will also be able to make and contact more mutual friends. This may improve their perceived usefulness which, in turn, may improve their satisfaction. From the perspective of perceived complementarity, when more users adopt a specific MIM service, the users will be able to access additional services, such as game, music, payment, and shopping service, which are developed by the provider of MIM service or third-party organizations. As users will be able to access various services via a single platform, this may improve their perceived usefulness which, in turn, may improve their satisfaction. The positive effects of referent network size and perceived complementarity on satisfaction have been confirmed in Zhou and Lu (2011) Based on these findings, we hypothesize as follows.

H3a: Referent network size has a positive impact on satisfaction.
H3b: Perceived complementarity has a positive impact on satisfaction.

Value can be divided into two categories: utilitarian value (also reflected by the usefulness) and hedonic value (also reflected by the enjoyment). Utilitarian value results from the conscious pursuit of an intended consequence (Badin et al., 1994) and represents customer's value as the means to end (Chandon et al., 2000). Utilitarian value is an overall assessment of the balance between functional benefits and sacrifices (Overby and Lee, 2006). In the context of MIM service, when referent network size is large, the individual user can communicate with more peers. This may improve their perceived utility which, in turn, may improve their overall perceived value. On the other hand, the hedonic value is an outcome related to spontaneous responses that are more subjective and personal (Badin et al., 1994) and can be derived from fun and enjoyment than from task completion. In the context of MIM, when more users adopt a MIM, the users will be able to access various additional services, some of which will bring the users more fun, such as game service. Besides, the supply of a wide range of communication support tools

(video chatting function) and emotional icons will also bring the users more fun during the process of chatting. Based on these findings, it's reasonable to expect referent network size, and perceived complementarity affect perceived value, and hence we present the following hypotheses:

> **H3c:** Referent network size has a positive impact on perceived value.
>
> **H3d:** Perceived complementarity has a positive impact on perceived value.

4. Interaction

Interaction is defined as two or more objects communicating and affecting each other (Laurel, 1993). It's noteworthy that interaction is a multidimensional concept. According to Coyle and Thorson (2001), they mention that interaction is based on either interpersonal communication or user-machine communication. In the context of social network games (SNG), Chang (2013) adopted and divided the construct of interaction into human-computer interaction and social interaction and found that both of them had significant influences on the generation of player's satisfaction. In other words, if the SNG players can interact with the game system or with other players more effectively, their satisfaction

will be enhanced. In the context of online financial service, Ding et al. (2010) found that both social interaction and human-computer interaction positively impacted the generation of user's satisfaction. In the context of MIM service, as more and more additional services and functions have been integrated into the original MIM service, the requirements of a reasonable and effective application interface to help the users to easily access all these services and functions has become more important than ever. A beautiful and effective application interface may increase user's experience which, in turn, may enhance user's satisfaction. Considering that application interface is the only medium for users to connect with MIM service, interface intention is adopted in this study instead of human-computer interaction. Based on Sheppard and Rouff (1994), interface interaction is defined as the extent to which the user believes the application interface enables him/her to get full access to the MIM service. On the other hand, as the main purpose for the users to adopt a MIM service is to communicate with their friends in a more enjoyable and effective way, whether the MIM service enables the users to achieve their basic purpose or not may impact user's satisfaction towards the MIM service. In other words, the better the social interaction perceived by the users,

the more users' satisfaction could be. Based on Chang (2013), social interaction is defined as the extent to which the user believes the MIM service provides him/her efficient way to create and improve the communication between users. Based on the findings mentioned above, it's reasonable to expect that interface interaction, and social interaction may positively affect satisfaction in the context of MIM service. Hence, we posit the following hypotheses:

H4a: interface interaction has a positive impact on satisfaction.

H4b: social interaction has a positive impact on satisfaction.

Drawing upon the established prior empirical findings, we propose the research model shown in Figure. 1. This research model is mainly constructed based on the effects of network externalities and interaction on the generation of continuance intention through satisfaction. Furthermore, the moderating effect of perceived value on the relationship between satisfaction and continuance intention and the antecedent effect of network externalities on perceived value is also investigated in this study.

III. Research methodology

The questionnaire used in this study was carefully designed based on the related literature. After the completion of the draft, a pretest was conducted using experts and users, both of which are
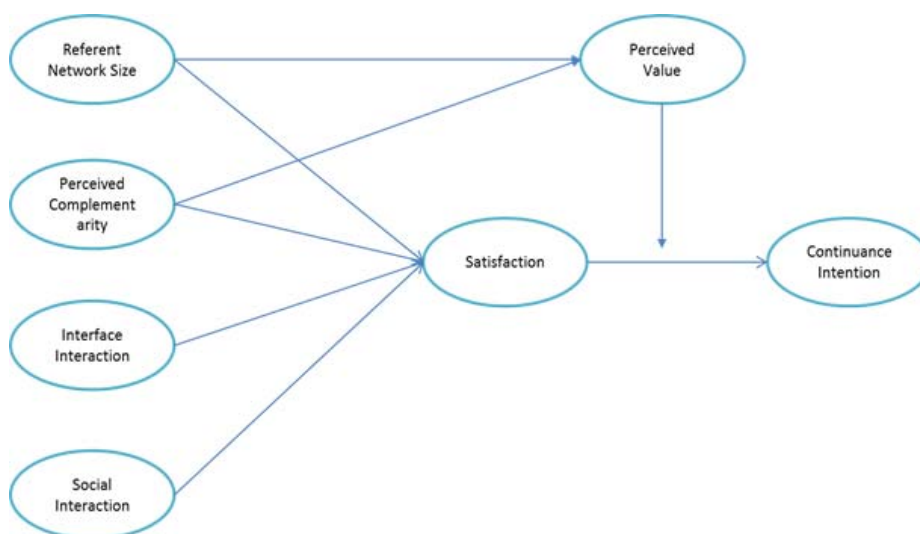
<Figure 1> Research Model

<Table 1> Questionnaire

Construct	Questionnaire	Literature
Interface Interaction (II)	I feel that MIM application provides good navigation structure.	Chang(2013)
	I feel that MIM application offers good visual display that can be read comfortably.	
	I feel that the interface of MIM application is easy-to-use.	
	Overall, I feel that MIM application provides good user interface.	
Social Interaction (SI)	Using MIM service enables me to make more friends.	Choi and Kim(2004) Lee(2009) Chang(2013)
	I enjoy communicating with my friends via MIM service.	
	MIM service provides me various communication ways, such as video mail, voice mail.	
	Using MIM service enhances my social experience.	
Referent Network Size (RNS)	I think many friends around me use MIM service.	Lin and Bhattacherjee (2008) Zhou and Lu(2011)
	I think most of my friends are using MIM service.	
	I anticipate more friends will use MIM service in the future.	
Perceived Complementary (PC)	A wide range of value - added services(such as games) are available on MIM service.	Lin and Bhattacherjee (2008) Zhou and Lu(2011) Lin and Lu(2011)
	A wide range of images, skins and emotional icons are available on MIM.	
	A wide range of support tools(such as video chat and free call) are available on MIM.	
Perceived Value (PV)	Using MIM service is worth for me to sacrifice something(such as money, time, or effort).	Kuo et al.(2009)
	Compared with other available alternatives, it is wise to use MIM service	
	I think MIM service delivers me a good value.	
Satisfaction (SN)	Using MIM service makes me feel satisfied.	Bhattacherjee(2001)
	Using MIM service makes me feel pleased.	
	Overall, I am satisfied with MIM service.	
Continuance Intention (CI)	I would recommend anyone to use MIM service.	Bhattacherjee(2001)
	I intend to continue to use MIM service in the future.	
	I intend to use MIM service as much as possible.	
	I would encourage those who are important to me to use MIM service.	

familiar with MIM service. The pretest aimed to avoid ambiguous expressions in the questionnaire. Thus, to a large extent, the content validity of the questionnaire could be ensured. The question was composed of two sections. The first section was intended to collect each respondent's personal information, such as

gender, age, and so on. The second section was intended to measure respondent's perception of each construct in the research model. seven constructs were measured by 24 items with a five–point Likert scale ranging from "strongly disagree" to strongly agree The details of each item and related literature are provided in Table 1.

IV. Data Analysis

1. Descriptive analysis

As most of the university students have the experiences of using MIM service, we collected the data in two universities, both of which are located in Beijing, China. In total, 297 respondents answered the survey and 25 surveys were discarded due to insincere responses. Finally, 272 responses were used for analysis in this study. The response rate is 91.6%. The population demographics are shown in Table 2.

2. Validity & Reliability analysis

Following Hair et al. (1998)'s recommendation, factor loadings greater than 0.5 can be considered as the critical value of significance to verify convergent validity. A stricter criterion of factor loading greater than 0.70 was proposed by Fornell (1982). Convergent validity also can be estimated by average variance extracted (AVE). The criterion of AVE greater than 0.50 was proposed by Fornell and Larcker (1981). As all the factor loading of items in the research model were greater than 0.70 and each measured construct had an average variance extracted (AVE) greater than 0.50, it is clear that a good convergent validity could be obtained. Moreover, reliability can be estimated by composite reliability (CR), Cronbach's α and squared multiple correlations (SMC). The composite reliability (CR) of each construct in the research model was greater than 0.70, which was recommended by Hair et al. (1998). The Cronbach's α of each construct was greater than 0.60 and all the squared multiple correlations(SMC) of the measured variables, excluding II 2(0.490), were larger than 0.50, indicating that a good reliability could be obtained in this study (Bagozzi and Yi, 1988; Hair et al., 1998).

<Table 2> Demographic statistics

Gender	%	Freq.
Male	56.25	153
Female	43.75	119
Age	%	Freq.
Under 20	28.31	77
20–29	50.74	138
30–39	12.13	33
Over 40	8.82	24
Educational	%	Freq.

Bachelor's degree	47.79	130
Masters	31.99	87
PHD	20.22	55

N = 272

Moreover, to test discriminant validity, we checked whether the square root of AVE for each construct exceeded the bivariate correlations between the construct and all other constructs. The square roots of AVE are indicated along the principal diagonal of the correlation matrix in Table 4. As the lowest of square roots of AVE among all constructs was 0.784, it was larger than the highest bivariate correlation value between each pair of constructs in this study. Hence, the discrimination validity was also adequate for the measurement model in this study (Fornell and Larcker, 1981).

3. Model fit analysis

Table 5 shows the results of Goodness Fit Index for measurement model and structural model of this study. From the fit indices, we can know that the research model suggested in this study is appropriate to estimate the relationships among all these constructs. Comparison of all fit indices with their corresponding recommended values reveal that there is evidence of a good model fit (Hair et al., 1998).

4. Hypotheses test

The main purpose of this study is to identify the relationships among network externalities, interaction, satisfaction, perceived value, and continuance intention. To achieve this objective, the structural equation model(SEM) is employed to test the interrelationships among all these constructs through AMOS 18.0.

Meanwhile, as R^2 is considered as the most powerful indicator for variance explanation, we also indicate the of satisfaction, perceived value, and continuance intention in the SEM. Figure. 2 shows the standardized path coefficients, t-value, and the coefficients of determination(R^2) of the latent variables. According to Figure. 2, continuance intention is directly influenced by satisfaction($\gamma = 0.317$; $t = 5.841$). Thus, H1 is supported. This result is consistent with the suggestion of prior ECM-based research projects (Kim, 2010; Kuo et al., 2009). It implies that when customers have high levels of satisfaction with MIM service, they are more likely to continue using the service in the future and encourage their friends or relatives to do so.

From the perspective of network externalities, both referent network size($\gamma = 0.144$; $t = 2.644$) and perceived complementarity($\gamma = 0.241$; $t = 3.615$)

<Table 3> Confirmatory Factor Analysis & Reliability Test & Convergent Validity Test

Construct	Item	Standardized item Loading	Cronbach's α	SMC	CR	AVE
Referent Network Size (RNS)	RNS 1	0.872	0.856	0.661	0.903	0.757
	RNS 2	0.890		0.782		
	RNS 3	0.847		0.576		
Perceived Complementarity (PC)	PC 1	0.776	0.836	0.685	0.869	0.688
	PC 2	0.873		0.598		
	PC 3	0.837		0.605		
Interface Interaction (II)	II 1	0.872	0.862	0.688	0.897	0.686
	II 2	0.770		0.490		
	II 3	0.808		0.580		
	II 4	0.858		0.699		
Social Interaction (SI)	SI 1	0.853	0.855	0.716	0.884	0.657
	SI 2	0.775		0.528		
	SI 3	0.764		0.531		
	SI 4	0.846		0.628		
Perceived Value (PV)	PV 1	0.828	0.842	0.701	0.852	0.658
	PV 2	0.820		0.545		
	PV 3	0.785		0.686		
Satisfaction (SN)	SN 1	0.787	0.873	0.752	0.827	0.615
	SN 2	0.794		0.728		
	SN 3	0.771		0.624		
Continuance Intention (CI)	CI 1	0.848	0.941	0.782	0.915	0.729
	CI 2	0.882		0.761		
	CI 3	0.855		0.805		
	CI 4	0.830		0.838		

had significant influences on satisfaction. Hence, H3a and H3b are supported. In other words, customers' satisfaction will be enhanced, when they can communicate with more peers and have access to more useful and additional services. This result is congruent with the suggestion of prior research on MIM service [44]. As expected, perceived complementarity(γ = 0.319; t = 4.209) significantly influenced perceived value, indicating H3d is supported. There is no doubt that the additional services, which can bring customers more usefulness(such as online shopping service) and more enjoyment(such as game service), are helpful to generate customers' perceived value of MIM service. But referent network size(γ = 0.021; t = 0.289) had no significant influence on perceived value, indicating H3c is not supported.

From the perspective of interaction, as satisfaction is directly influenced by both interface interaction(γ = 0.335; t = 6.094) and social interaction(γ = 0.376; t = 6.500), H4a and H4b are supported.

<Table 4> Discrimination Validity Test

	RNS	PC	II	SI	PV	SN	CI
RNS	0.870						
PC	0.259**	0.829					
II	−0.053	−0.019	0.828				
SI	0.066	0.149*	0.206**	0.811			
PV	0.081	0.244**	0.075	0.169**	0.811		
SN	0.236**	0.395**	0.338**	0.473**	0.280**	0.784	
CI	0.181**	0.313**	0.162**	0.285**	0.591**	0.433**	0.854

These results echo the findings of the previous study in the domain of s ocial network games (Chang, 2013). When a friendly application interface and a better social experience is perceived by customers, their satisfaction towards MIM service will be enhanced.
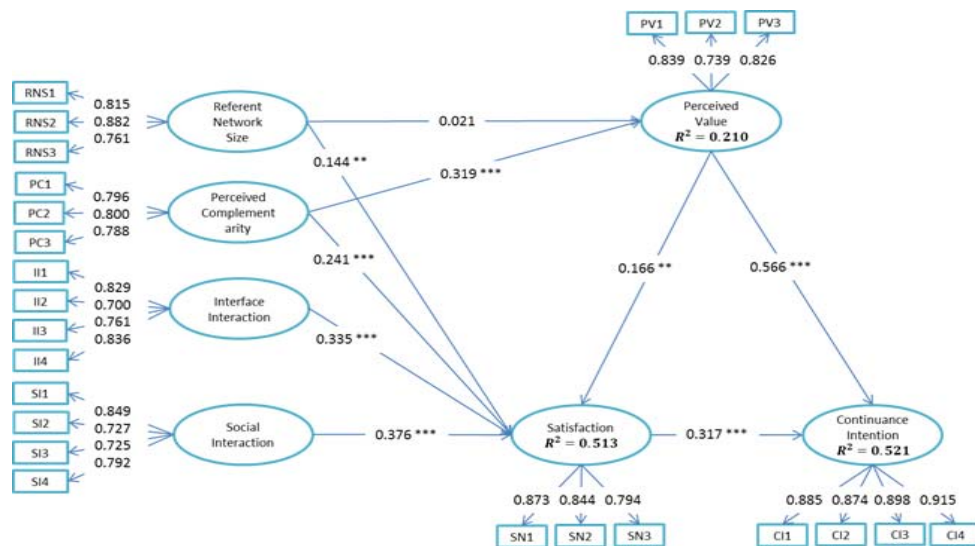
5. Moderating effect analysis

In this study, regression analysis was conducted to examine the moderating effect of perceived value on the relationship between satisfaction and continuance intention through SPSS 18.0. In formal terms, the examination of moderating effect requires a three-step hierarchical analysis, in which the independent variable(s), the moderating variable(s), and the multiplicative cross-product terms are entered in sequence (Cohen and Cohen, 1983). The moderating effect of perceived value is tested by the increase in R2 and the related F-value. Compared with the reduced model and the full model in Table 6, as the change of F-value is 8.538 and the associated p-value is 0.004, the

<Table 5> Model Fit Analysis

Fit indices	Recommended value	Measurement indices	Structural indices
X2/DF	<3.000	1.721	1.726
GFI	>0.900	0.897	0.894
AGFI	>0.800	0.865	0.865
NFI	>0.900	0.907	0.904
CFI	>0.900	0.958	0.957
PGFI	>0.600	0.685	0.701
RMR	<0.080	0.045	0.058
RMSEA	<0.080	0.052	0.052

<Figure 2> SEM analysis

moderating effect of perceived value on the relationship between satisfaction and continuance intention is significant. Hence, H2 is supported.

Moreover, to test how the different levels of perceived value will influence the relationship between satisfaction and continuance intention, cluster analysis was carried out to divide perceived value and satisfaction into high and low groups. Then, we cross these groups and get four alignments. The first group involves the respondents with low perceived value and low satisfaction(n = 24); the second group involves the respondents with low perceived value and high satisfaction(n = 36); the third group involves the respondents with high perceived value and low satisfaction(n = 41); and the fourth group involves the respondents with high perceived value and high satisfaction(n = 171). The ANOVA analysis and Scheffe post-hoc test are shown in Table 7. According to the results of ANOVA analysis, both F-value and p-value are significant(F = 68.945, p < 0.001). The results of Duncan and Scheffe post-hoc indicated that the four groups have significant differences between each other. The continuance intention of the first group is the lowest, and the continuance intention of the fourth group is the highest. The continuance intention of the first group is the lowest, and the continuance intention of the fourth group is the highest. The continuance intention of the third group is higher than the second group. In other words, when

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<Table 6> A hierarchical regression model(perceived value as the moderator)

Indices	Variables	Reduced model		Full model	
		Regression coefficient, β	p–value	Regression coefficient, β	p–value
	Constant	−0.014	0.960	−1.377	0.012**
	SN	0.376	0.000**	0.804	0.000**
	PV	0.656	0.000**	1.067	0.000**
	SN * PV			−0.125	0.004**
R^2 (Adjusted R^2)		0.427(0.423)		0.445(0.439)	
F–value (d.f.)		100.304(2)		71.589(3)	
Change of F (p–value)		8.538(0.004**)			

**$p < 0.05$

perceived value is high, even less satisfied customers are more likely to continue using MIM service than highly satisfied customers, who have low perceived value.

V. Implications

1. Implications for academic researchers

For academic researchers, this study contributes to the theoretical understanding of the antecedents, which can be used to promote customer's continuance intention towards MIM service. From the perspective of interaction, there are only a few previous stud ies associated with the construct of interaction. The constructs of interface interaction and social interaction adopted from Chang (2013) are accepted as the most important antecedent to generate customer's satisfaction which, in turn, will generate customer's continuance intention in the context of MIM service. These findings can be considered as strong evidence for scholars to extend the adoption of interaction to other interactive applications, such as mobile shopping service and mobile SNG service. From the perspective of network externalities, both referent network size and perceived complementarity played an important role in the generation of satisfaction. But it's noteworthy that compared with the influence of perceived complementarity on satisfaction, the influence of referent network size on satisfaction is relatively small. In this study, we also explored the influences of referent network size and perceived complementarity on perceived value. Based on the results of SEM analysis mentioned above, only perceived complementarity had a significant influence on perceived value whereas referent

<Table 7> ANOVA analysis

	Low perceived value		High perceived value		Duncan	Scheffe Post-hoc
	Low satisfaction n = 24	High satisfaction n = 36	Low satisfaction n = 41	High satisfaction n = 171		
Continuance intention	1.823	3.306	3.872	4.278	(1,2,3,4)	1 < 2 < 3 < 4
F-value: 68.945 p-value: 0.000***						

***$p < 0.001$

network size had an insignificant influence on perceived value. In other words, customers' perceived value won't be affected by the number of peers that the customers can communicate with through the MIM service, but can be affected by the additional services, which can bring the customers more practical functions or enjoyment. Furthermore, the moderating effect of perceived value on the relationship between satisfaction and continuance intention was confirmed in this study. The most interesting finding in this study is that less satisfied customers, who have high perceived value, will have higher intention to continue using MIM service than highly satisfied customers, who have low perceived value.

2. Implications for MIM providers

From the perspective of interaction, MIM practitioners need to improve the interface design and bring an engaging usage experience to their customers (Lee and Benbasat, 2004). In other words,

considering the limitations of mobile terminals, such as small screen, and the tendency that more and more practical functions and additional services will be integrated into the original MIM service, an easy to use and friendly application interface will be helpful to enhance customers' usage experiences which, in turn, will enhance customers' satisfaction. On the other hand, even the MIM providers have made tremendous efforts to enhance customers' social experiences through providing more convenient communication tools, but the result seems not so satisfactory from the customers' standpoint. For instance, there is no doubt that free VOIP is one of the most expected communication tools to enhance customers' social experiences(enhanced social interaction), and lots of MIM providers, such as Wechat, Kakao Talk, Line, etc. have already provided their customers with free VOIP. But in fact, due to the serious network delay and the lack of bandwidth optimization from the mobile communication operators, the actual

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usage experience of free VOIP is completely unable to make the customers satisfied. Hence, MIM providers should put more effort on "quality over quantity" of these communication tools to provide "real convenience" to their customers.

From the perspective of network externalities, it is difficult for MIM providers to control referent network size, but they can affect perceived complementarity by providing additional services or practical functions to their customers. As perceived complementarity is the only antecedent which can be used to promote satisfaction and perceived value simultaneously, perceived complementarity plays the most important role among these four antecedents in this study. It indicates that in the short term, perceived complementarity is helpful to enhance customers' continuance intention; in the long term, perceived complementarity is the most powerful weapon for MIM providers to establish their competitive ecosystem. How to integrate these additional services into a unified platform and provide their customers with the consistent usage experience is the primary issue that MIM providers need to solve.

VI. Conclusions

In this study, the construct of interaction, which was further divided into interface interaction and social interaction, was proposed in the context of MIM service; the measurement scales of interface interaction and social interaction were adapted and carefully modified based on Chang (2013). As expected, the significant influences of interface interaction and social interaction on satisfaction indicate that adopting the construct of interaction as an antecedent in the context of MIM service is adequate. Hence, it is reasonable for us to suggest the adoption of the construct of interaction can be expended to other interactive applications, such as mobile shopping service and mobile SNG service. For network externalities, the significant influence of network externalities on satisfaction was verified in this study, which is consistent with the suggestion of the previous study in the same domain (Zhao and Lu, 2012). Moreover, we explored the relationship between network externalities and perceived value. According to our results, there is a significant influence of perceived complementarity on perceived value. Furthermore, we examined the relationships among perceived value, satisfaction, and continuance intention. The significant influence of satisfaction on continuance intention, found in this study, is consistent with many ECM—related studies (Hong et al., 2006; Kim, 2010). Meanwhile, we also verified that perceived

value has a significant moderating effect on the relationship between satisfaction and continuance intention. According to the results of Duncan and Scheffe post−hoc test, we found that when perceived value is high, even less satisfied customers are more likely to continue using the MIM service than highly satisfied customers, who have low perceived value.

Even though this study succeeds in validating the research model according to prior empirical findings, there are some limitations of our study. First, all the data collected for this study came from university students to simplify the process of obtaining data. While students are avid users of IM service, they represent only one segment of the population, and the study should be repeated with a wider cross−section of the population. Second, as one of the main purposes is to verify the role of network externalities in the context of MIM service, we only explored the relationship between network externalities and perceived value. However, more potential factors should be taken into account in future studies as the R^2 of perceived value (0.210) is relatively low in this study. Third, this study has confirmed the flexibility in adopting the interaction construct in the context of MIM service. Further studies in different domains and settings are necessary to help extend the validity of these findings.

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