
Understanding mobile IM continuance usage from the perspectives of network externality and switching costs

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Abstract: Retaining users and facilitating their continuance usage are essential for mobile service providers to increase both revenues and profits. This research integrates the perspectives of network externality and switching costs to propose a model for investigating the continuance usage of mobile instant messaging services. Network externality arises from both direct and indirect sources and is conceptualised as referent network size and perceived complementarity, respectively. The results show that perceived complementarity is the main factor affecting perceived enjoyment, whereas referent network size has a strong effect on perceived usefulness. Switching costs is the main factor determining switching barriers. Perceived usefulness, perceived enjoyment and switching barriers determine continuance usage.

Keywords: mobile IM; network externality; switching costs; perceived enjoyment; mobile communications.

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1 Introduction

The application of third generation (3G) mobile communication technologies has triggered the development of the mobile internet. According to a report released by China Internet Network Information Centre (CNNIC) in July 2013, the number of mobile internet users in China had reached 464 million by the end of June 2013, accounting for 78.5% of its internet population (591 million) (CNNIC, 2013). In China, mobile internet users are increasingly using a variety of mobile services such as mobile instant messaging (IM), mobile games, mobile purchasing and mobile payment. Prior studies show that consumers use mobile services mainly for four different purposes: communication, information, transaction and entertainment (Hong et al., 2008). Among them, communication-oriented mobile services such as mobile IM have received wide adoption among users. It was reported that about 85.7% of mobile internet users in China have used mobile IM (CNNIC, 2013). Prior information systems (IS) literature notes that initial acceptance is merely an important first step towards IS success since users may discontinue their usage after initial adoption (Bhattacharjee, 2001). Thus, the success of mobile service providers may rely more on their ability to retain users and promote continuance usage rather than their ability to acquire new users.

Mobile IM offers convenience to its users by allowing them to communicate with peers anytime and anywhere. As a result, many businesses have stepped into the mobile IM market and released their own products. In China, four mobile IM products have become popular: mobile QQ, Fetion, mobile MSN and mobile Wangwang. Mobile QQ is operated by Tencent, which is the largest IM service provider in China. Fetion was launched by China Mobile, the largest mobile operator in China. Mobile MSN is operated by Microsoft, whereas mobile Wangwang is owned by Alibaba, the largest e-business company in China. The four products offer similar functions such as text chatting, picture sharing and games, which has resulted in intense competition between them.

To achieve both competitive advantages and business success, service providers need to acquire and retain users. Retaining users is financially imperative for mobile service providers because acquiring a new customer typically costs five times more than retaining an existing customer (Reichheld and Scheffer, 2000). Thus, retaining existing users has become a vital issue for mobile service providers in their attempts to reduce their costs and increase profits, particularly in the current competitive environment.

Prior research has adopted multiple theories such as the technology acceptance model (TAM) and flow theory (Lu et al., 2009; Zaman et al., 2010) to examine user adoption of IM. Compared with other services, mobile IM, as an interactive technology, may exert a significant network externality effect on user adoption. As more and more people start to use mobile IM, additional utilities, such as the ability to communicate with more peers, can be expected. On the other hand, service providers and third-party developers are providing more and more value-added functions and services. This enhanced network externality may have an effect on a user's continuance usage of mobile IM. Furthermore, service providers also need to curb the switching behaviour of users and lock them into a stable relationship to facilitate the continuance use. This research examines the factors affecting mobile IM continuance usage by integrating the perspectives of network externality and switching costs. In this study, network externality arises from direct and indirect sources and is conceptualised as referent network size and perceived complementarity, respectively. Perceived usefulness, perceived enjoyment and switching barriers are investigated as mediators between network externality, switching costs and continuance usage. An online survey was conducted to collect empirical data in the context of mobile IM. Structural equation modelling was employed to examine construct reliability, validity as well as the research model and hypotheses.

The rest of the paper is organised as follows. The research model and hypotheses are discussed in Section 2. Section 3 describes the instrument development and data collection approach. Section 4 presents the research results and is followed by a discussion on the research findings in Section 5. Finally, the implications and limitations of this study are presented in Section 6.

2 Research model and hypotheses

2.1 User adoption of IM

The adoption of IM has received considerable attention in IS research. Flow theory has been employed to examine user adoption of IM. Flow reflects the holistic sensation that people feel when they act with total involvement (Csikszentmihalyi and Csikszentmihalyi, 1988). Prior research indicates that flow represents an optimal experience, which increases the likelihood of user adopting an IS (Finneran and Zhang, 2005; Hoffman and Novak, 2009). Zaman et al. (2010) examined the effect of flow on IM users' creative behaviour and found that flow does exert an influence over their behaviour. Chen et al. (2008) noted that flow affects IM users' communication outcomes such as communication effectiveness and quality. Lu et al. (2009) integrated flow theory, the theory of planned behaviour and TAM to examine user adoption of IM and found that flow affects both attitude towards IM use and the intention to use IM.

In addition to flow, social influence also affects user intention to adopt IM (Shen et al., 2011). Social influence theory argues that user attitude may change through

three processes: compliance, internalisation and identification, which are represented by subjective norms, group norms and social identity, respectively (Kelman, 1974). Glass and Li (2010) reported that social influence, including both subjective norms and perceived critical mass, has a significant effect on IM adoption. Lin (2011) found that social support affects IM usage through social capital, which includes six dimensions: commitment, reciprocity, shared codes and language, shared narratives, centrality and network ties.

Other theories such as TAM are also used to examine IM user behaviour. Li et al. (2010) adopted a motivational model to compare the individual acceptance of IM in the USA and China. The results indicate that both perceived usefulness and perceived enjoyment affect usage intention. Luo et al. (2010) identified that perceived usefulness, compatibility, enjoyment and security affect user intention to adopt enterprise IM. Deng et al. (2010) noted that trust, satisfaction and switching costs affect user loyalty towards mobile IM.

2.2 Network externality

Network externality reflects the additional utility associated with an increased number of users (Strader et al., 2007; Dickinger et al., 2008). Network externality includes both direct and indirect externality. Direct externality is related to the number of users. With the expansion of a user base, it is possible for individual users to communicate with more peers by means of mobile IM. Indirect externality means that more complementary functions and services are available to users when the number of users increases. For example, users can access various applications on the Windows platform owing to its vast user base, whereas only a limited amount of applications are available to the users of the Linux platform. With respect to mobile IM, when the number of users increases, service providers may be more willing to offer additional value-added services such as group chat, avatars, music and games to users.

The concept of network externality originates from economics (Katz and Shapiro, 1985). Recently, it has been applied to examine IS user behaviour. Prior research indicates that network externality exerts an important influence on the adoption of an IS by users. Wattal et al. (2010) examined the user adoption of intra-organisational blogs and found that network externality affects the user adoption of those blogs. Lin and Bhattacharjee (2008) investigated IM usage by integrating network externalities with traditional usage motivations, and found that network externality is one of the key predictors in determining the intention of users to adopt interactive information technologies. Strider et al. (2007) suggest that network externality affects the usage intention of electronic communication systems via perceived usefulness. Lin and Lu (2011) integrated network externality and motivation theory to explain the continued use of social network sites and found that network externality affects the intention to continue using social network sites via perceived usefulness and perceived enjoyment.

In this research, we measured network externality with two factors: referent network size and perceived complementarity. Referent network size represents direct externality and measures the number of peers using a mobile IM product. A large referent network size makes it possible for an individual user to communicate with more friends and colleagues. This may increase a user's perception of the usefulness of using the technology. If the referent network size is small, a user can only connect with a few peers in his or her social circle, which may lower the perceived utility of the technology in his

or her eyes. Strader et al. (2007) also noted that referent network size affects the perceived usefulness of e-mail. Thus, we propose that:

H1: Referent network size is positively related to the perceived usefulness of mobile IM.

In addition, referent network size may affect the perceived enjoyment of using a mobile IM. For example, when the referent network size is large, users can invite many friends to conduct a group chat centring on a particular topic they want. They may also share their pictures and videos with more friends and colleagues. This might increase their perceived enjoyment of using the technology. Lin and Bhattacharjee (2008) state that referent network size affects the perceived enjoyment associated with interactive information technologies. Lin and Lu (2011) also found that the number of peers (similar to referent network size) affects the perceived enjoyment of social network sites. Consistent with the prior literature, we suggest that:

H2: Referent network size is positively related to the perceived enjoyment of mobile IM.

Perceived complementarity reflects indirect externality and means that many value-added functions and services are available to users. As the number of users increases, mobile IM service providers often update their products and services, seeking to offer more optional functions, such as picture sharing, music, video and games functions, to their customers. The availability of various functions from service providers or third parties may also improve the perceptions users have of the usefulness of using a mobile IM, as they can access more services in a single platform. For example, a user would be able to automatically login to ancillary games with his or her mobile IM account. Peers could also know which game a user is playing by clicking on the avatar icon representing the user. In addition, these optional functions and services such as avatars and games may bring more enjoyment to users, as they can obtain a better experience with these ancillary services. Zhou and Lu (2011) state that perceived complementarity has a strong effect on the perceived enjoyment of instant messaging. Lin and Lu (2011) found that perceived complementarity has a significant influence on the perceived usefulness and enjoyment of using social network sites. In line with the findings in prior studies, we propose that:

H3: Perceived complementarity is positively related to the perceived usefulness of mobile IM.

H4: Perceived complementarity is positively related to the perceived enjoyment of mobile IM.

2.3 Switching costs

Switching costs reflect the expected costs of switching from a current service provider to an alternative one (Ray et al., 2012). Switching costs consist of three different cost parts, which are sunk costs, learning costs and continuance costs (Ranganathan et al., 2006). Sunk costs refer to the unrecoverable time and effort spent on using original products (Whitten and Wakefield, 2006). Learning costs are defined as those costs incurred when learning to use a new product. Continuance costs refer to lost benefits when switching and they can include such things as losing awards, discounts and convenience (Chen and Hitt, 2002; Ray et al., 2012).

Network externality may have an effect on switching costs. When the referent network size is large and perceived complementarity is significant, users may lose many benefits, such as communication convenience and rich value-added functions, if they plan to switch to alternative IM platforms. Thus, we expect that both referent network size and perceived complementarity will have an impact on switching costs.

H5: Referent network size is positively related to switching costs.

H6: Perceived complementarity is positively related to switching costs.

Switching barriers refers to the degree to which a user experiences a sense of being locked into a relationship (Tsai and Huang, 2007). Switching barriers are based on the economical, psychological and social costs derived from switching behaviour. If service failures occur, switching barriers can give service providers enough time to recover user confidence in the use of their services (Tsai et al., 2006). Switching barriers and switching costs are two different concepts. Switching barriers emphasise the feeling of being locked into (or committed to) (Tsai and Huang, 2007) an IM, whereas switching costs highlight the economic losses involved in switching. Switching costs may affect the switching barriers. When switching costs are expensive, users might encounter a significant barrier to switching to alternative services owing to the financial costs arising from switching (Tsai et al., 2006; Lai et al., 2012). Thus, we propose that:

H7: Switching costs are positively related to switching barriers.

2.4 Continuance usage

Perceived usefulness as a main factor in TAM has been found to be a stable variable that predicts user behaviour, which includes initial usage and continuance usage (Venkatesh and Davis, 2000; Teo et al., 2012). Perceived usefulness represents an extrinsic motivation emphasising behavioural outcomes. With regard to mobile IM, perceived usefulness reflects the expected utility, such as the improvement of communication performance and the effectiveness associated with the use of a mobile IM. Perceived enjoyment represents an intrinsic motivation, emphasising the usage process (Davis et al., 1992; Lee and Quan, 2013). Perceived enjoyment may also promote continuance usage, as it improves the user experience of using mobile IM. Thus, the following two hypotheses are proposed:

H8: Perceived usefulness is positively related to continuance usage.

H9: Perceived enjoyment is positively related to continuance usage.

In addition, both perceived usefulness and perceived enjoyment may affect switching costs. When users have obtained a positive utility and an enjoyable experience from using a mobile IM platform, they may face expensive switching costs if they plan to switch to another platform, as they may lose the benefits they have accumulated in the use of this IM platform. Thus, we posit that,

H10: Perceived usefulness is positively related to switching costs.

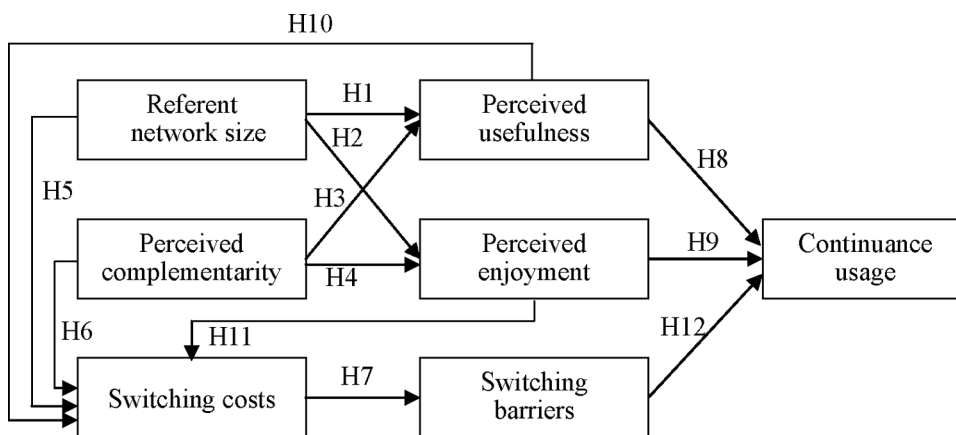
H11: Perceived enjoyment is positively related to switching costs.

Compared with the enabling effects of both perceived usefulness and perceived enjoyment on user behaviour, switching barriers may exert an effect as inhibitors (Zhou, 2013). Switching barriers may prevent users from switching and, therefore, may help facilitate continuance usage. Prior research has validated the effect of perceived usefulness (Shin et al., 2010), perceived enjoyment (Thong et al., 2006; Lee et al., 2007) and switching barriers (Tsai and Huang, 2007) on continuance behaviour. Therefore, we suggest that:

H12: Switching barriers are positively related to continuance usage.

The proposed research model is presented in Figure 1.

Figure 1 Research model



3 Research method

Seven constructs are included in the research model, which are referent network size, perceived complementarity, switching costs, switching barriers, perceived enjoyment, perceived usefulness and continuance usage. Each factor was measured with multiple items adapted from the extant literature to improve content validity (Straub et al., 2004). These items were first translated into Chinese by a researcher. Then, another researcher translated them back into English to ensure consistency through a comparison of the two versions. The instrument was first pretested among 10 users with rich mobile IM usage experience. We revised some items to improve the clarity and understandability of the instrument according to the comments of the pre-testers. The final items and their sources are listed in the Appendix.

Items of referent network size and perceived complementarity were adapted from Lin and Bhattacharjee (2008). Items of referent network size focus on the evaluation of peers including friends and colleagues, while items of perceived complementarity reflect how various ancillary functions, such as games, emoticons and file transference, are available to users. Switching costs and switching barriers were measured using the items adapted from Tsai et al. (2006). Items of switching costs measure the effort, time cost and potential loss derived from switching. Items of switching barrier reflect the life disruption and limited choices associated with switching. Items of perceived enjoyment were

adapted from Koufaris (2002) to measure fun and excitement. Items of perceived usefulness and continuance usage were measured using the items adapted from Bhattacharjee (2001). Items of perceived usefulness measure the performance and improvement in effectiveness gained by using a mobile IM. Items of continuance usage reflect a user's intention to continue using mobile IM.

Data were collected via an online survey. We posted messages on forums and invited those who had mobile IM usage experience to participate in the survey. When users clicked on the link, they were directed to the survey webpage. They were asked to fill in the questionnaire based on their favourite mobile IM usage experience. We scrutinised all responses and dropped those that had too many missing values. In total, we obtained 223 valid responses, which were adopted as the sample base of this study. The gender split was 49.3% male and 50.7% female. The majority of the respondents (about 88%) were between 20 and 29 years old and approximately half (46.2%) had used mobile IM for three years.

To examine common method variance, we performed two tests. First, we conducted a Harman's single-factor test (Podsakoff and Organ, 1986). The results indicate that the largest variance explained by an individual factor is 13.66%. Thus, none of the factors can explain the majority of the variance. Second, we modelled all items as the indicators of a factor representing the method effect (Malhotra et al., 2006), and re-estimated the model. The results indicate a poor fit. For example, the goodness of fit index (GFI) is 0.635 (<0.90), and the root mean square error of approximation (RMSEA) is 0.165 (>0.08). On the basis of the results of both tests, we feel that common method variance is not a significant problem in our research.

4 Results

Following the two-step approach recommended by Anderson and Gerbing (1988), we first examined the measurement model to test reliability and validity. Then, we examined the structural model to test the research hypotheses.

First, we conducted a confirmatory factor analysis to examine the validity. Validity includes convergent validity and discriminant validity. Convergent validity measures whether items can effectively reflect their corresponding factor, whereas discriminant validity measures whether two factors are significantly different. Table 1 lists the standardised item loadings, the average variance extracted (AVE), the composite reliability (CR) and Cronbach Alpha values. As listed in the table, most item loadings are larger than 0.7. The *t* values indicate that all loadings are significant at 0.001. All AVEs and CRs exceed 0.5 and 0.7, respectively. Thus, the scale has a good convergent validity (Gefen et al., 2000). In addition, all Alpha values are larger than 0.7, suggesting a good reliability (Nunnally, 1978).

To examine the discriminant validity, we compared the square root of AVE and the factor correlation coefficients. As listed in Table 2, the square root of AVE for each factor is significantly larger than its correlation coefficients with other factors, suggesting a good discriminant validity (Fornell and Larcker, 1981).

Second, we applied structural equation modelling to estimate the structural model with the software tool LISREL. The research results are presented in Figure 2. Table 3 lists the recommended and actual values of some fit indices. Except for GFI, the other fit indices have better values than the recommended values. This indicates that the research

model has a good fitness (Gefen et al., 2000). The proposed model explains 26.1% of the variance of the switching costs, 42.3% of perceived usefulness, 23.2% of perceived enjoyment, 30.3% of switching barriers and 55.1% of continuance usage.

Table 1 Standardised item loadings, AVE, CR and alpha values

<i>Factor</i>	<i>Item</i>	<i>Standardised item loading</i>	<i>AVE</i>	<i>CR</i>	<i>Alpha value</i>
Referent network size (RNS)	RNS1	0.936	0.84	0.91	0.91
	RNS2	0.895			
Perceived complementarity (PC)	PC1	0.734	0.52	0.76	0.76
	PC2	0.753			
	PC3	0.668			
Switching costs (SC)	SC1	0.806	0.64	0.84	0.83
	SC2	0.903			
	SC3	0.681			
Perceived usefulness (PU)	PU1	0.843	0.61	0.82	0.82
	PU2	0.816			
	PU3	0.680			
Perceived enjoyment (PE)	PE1	0.719	0.63	0.87	0.87
	PE2	0.702			
	PE3	0.866			
	PE4	0.864			
Switching barriers (SB)	SB1	0.781	0.58	0.81	0.80
	SB2	0.814			
	SB3	0.685			
Continuance usage (USE)	USE1	0.764	0.56	0.79	0.79
	USE2	0.687			
	USE3	0.789			

Table 2 The square root of AVE (presented in italics on the diagonal) and the factor correlation coefficients

	<i>RNS</i>	<i>PC</i>	<i>SC</i>	<i>PU</i>	<i>PE</i>	<i>SB</i>	<i>USE</i>
RNS	<i>0.916</i>						
PC	0.620	<i>0.719</i>					
SC	0.293	0.419	<i>0.802</i>				
PU	0.613	0.488	0.318	<i>0.783</i>			
PE	0.374	0.411	0.391	0.584	<i>0.792</i>		
SB	0.372	0.302	0.517	0.520	0.592	<i>0.762</i>	
USE	0.441	0.432	0.423	0.670	0.674	0.664	<i>0.748</i>

5 Discussion

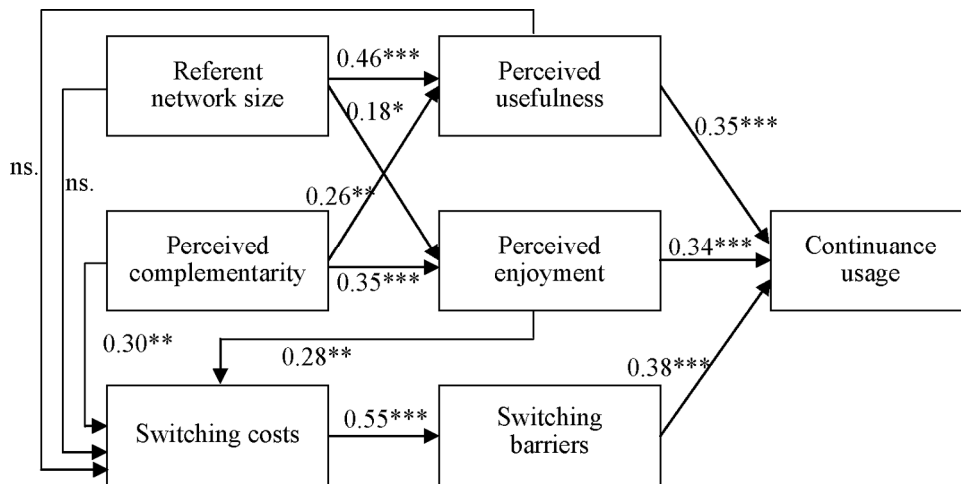
As shown in Figure 2, most of the proposed hypotheses are supported except for H5 and H10. Network externality affects continuance usage through perceived usefulness and perceived enjoyment, whereas switching costs affect continuance usage through switching barriers. Perceived complementarity and perceived enjoyment have significant effects on switching costs, but referent network size and perceived usefulness do not have effect on switching costs.

Table 3 The recommended and actual values of fit indices

Fit indices	χ^2/df	GFI	AGFI	CFI	NFI	NNFI	RMSEA
Recommended value	<3	>0.90	>0.80	>0.90	>0.90	>0.90	<0.08
Actual value	2.14	0.861	0.817	0.963	0.935	0.955	0.062

χ^2/df is the ratio between the Chi-square and degrees of freedom, GFI is the Goodness of Fit Index, AGFI is the Adjusted Goodness of Fit Index, CFI is the Comparative Fit Index, NFI is the Normed Fit Index, NNFI is the Non-Normed Fit Index, RMSEA is Root Mean Square Error of Approximation.

Figure 2 The results estimated by LISREL



* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$; ns: not significant.

The results indicate that the referent network size has a significant effect on perceived usefulness. Mobile IM, as a communication platform, enables users to conduct ubiquitous communication with their friends, classmates and colleagues. When the referent network size is large, users can communicate with more peers and acquire more utility. Thus, service providers need to focus on enlarging their user base. In China, mobile QQ has the largest user population among the four mobile IM products (mobile QQ, Fetion, mobile MSN and Wangwang). It has achieved a great competitive advantage over other competitors. However, the other mobile IM products also have their own specific user groups. For example, mobile QQ users are mainly young students, whereas mobile MSN users are mainly white-collar workers. This suggests that mobile MSN might expand its

user base in the segmented market, although it faces potentially intense competition from mobile QQ.

Compared with referent network size, perceived complementarity has a stronger effect on perceived enjoyment. This indicates that service providers need to present more value-added functions and services to users to improve their experience. Mobile IM is not only a productivity platform but also an entertainment platform (Li et al., 2010). In addition to the basic chat function, mobile IM products should include other functions such as avatars, music and games. Among various mobile IM products, mobile QQ may have the richest entertainment functions, whereas mobile MSN offers a limited amount of entertainment functions. Our results imply that mobile IM service providers need to enrich the availability of entertainment functions to deliver an engaging experience to users. In addition, mobile IM products can develop their own feature functions to improve user experience. For example, Fetion can be used to send chat content via short messages to another party when the other party is not online.

Switching costs significantly affect switching barriers. Switching costs include sunk costs, learning costs and continuance costs. Among them, sunk costs and learning costs might be less important because mobile IM is relatively easy to use and various mobile IM products have similar interfaces as well. Continuance costs are strengthened in mobile IM since service providers always use approaches such as membership-level benefits to increase continuance costs, further raising the switching barriers. For example, with their accumulated online time, mobile QQ users can obtain different member levels, from 'one star' to 'five suns'. This may increase switching costs and help prevent users from switching. In addition, we found that perceived complementarity and perceived enjoyment affect switching costs. This indicates that offering rich value-added functions and an enjoyable experience to users may also increase their switching costs. The results indicate that referent network size and perceived usefulness have no effect on switching costs. This suggests that users are not much concerned with the amount of users and perceived utility when considering the costs of switching from a mobile IM platform to an alternative one.

The results also indicate that perceived usefulness, perceived enjoyment and switching barriers have significant effects on continuance usage. These results are consistent with the findings of prior research (Lee et al., 2007; Tsai and Huang, 2007). This suggests that to facilitate continuance usage, mobile IM service providers need to develop enablers of continuance usage, such as perceived usefulness and enjoyment, as well as inhibitors of switching behaviours, such as switching barriers. In particular, switching barriers should be highlighted in developing strategies for retaining users, as they help to lock users into a relationship with a particular service provider and prevent them from switching.

6 Implications and limitations

This research integrated the perspectives of network externality and switching costs to examine mobile IM continuance usage. As noted earlier, the existing research has drawn on flow theory, social influence theory and motivational theory to understand IM user adoption. However, mobile IM as an interactive information technology may exert significant network externality, which has an effect on usage intention. In addition, switching costs may increase switching barriers and help to curb users' switching

behaviour. This may also affect their continuance usage. Drawing on the perspectives of network externality and switching costs, we identify the factors affecting the continuance usage of mobile IM. The results advance our understanding of mobile IM user behaviour. On the other hand, although network externality has been extensively examined in economics, it has received relatively less attention in IS research. Our research generalises network externality to the emerging service of mobile IM, enriching existing findings on network externality in IS literature.

In addition, the results suggest that referent network size and perceived complementarity, as the key sources of network externality, have different effects on perceived usefulness and enjoyment. Specifically, indirect externality (perceived complementarity) was found to be the main factor affecting intrinsic motivation (perceived enjoyment). This extends the findings of prior research that has focused on the effect of technological perceptions, such as perceived ease of use, on perceived enjoyment.

The research has the following limitations. First, we conducted this research in China, where the mobile internet is developing rapidly but is still in its early stage. Thus, our results need to be generalised to other countries that had developed mobile internet. Second, in addition to perceived usefulness, perceived enjoyment and switching barriers, there are some other enablers or inhibitors of continuance use, such as trust, satisfaction and habit. Future research should explore their effects. Third, we mainly conducted a cross-sectional study. However, user behaviour is dynamic. Thus, a longitudinal research may provide more insights into the development of user behaviour.

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Appendix: Measurement scale and items

Referent network size (RNS) (adapted from Lin and Bhattacharjee (2008))

RNS1: Most of my friends are using this mobile IM.

RNS2: Most of my colleagues are using this mobile IM.

Perceived complementarity (PC) (adapted from Lin and Bhattacharjee (2008))

PC1: A wide range of games is available on this mobile IM.

PC2: A wide range of images, skins and emoticons are available on this mobile IM.

PC3: A wide range of support tools (such as photograph sharing and file transference) are available on this mobile IM.

Switching costs (SC) (adapted from Tsai et al. (2006))

SC1: Switching to another mobile IM will cost me much effort.

SC2: Switching to another mobile IM will cost me much time.

SC3: Switching to another mobile IM will incur much loss to me.

Perceived usefulness (PU) (adapted from Bhattacharjee (2001))

PU1: Using this mobile IM improves my performance in conducting communication.

PU2: Using this mobile IM improves my effectiveness in conducting communication.

PU3: Overall, this mobile IM is useful in conducting communication.

Perceived enjoyment (PE) (adapted from Koufaris (2002))

PE1: I feel that using this mobile IM is fun.

PE2: I feel that using this mobile IM is exciting.

PE3: I feel that using this mobile IM is enjoyable.

PE4: I feel that using this mobile IM is interesting.

Appendix: Measurement scale and items (continued)

Switching barriers (SB) (adapted from Tsai et al. (2006))

SB1: It is very difficult for me to abandon this mobile IM.

SB2: My life will be disrupted if I abandon this mobile IM.

SB3: My choices will be limited if I abandon this mobile IM.

Continuance usage (USE) (adapted from Bhattacharjee (2001))

USE1: I intend to continue using this mobile IM rather than discontinue its use.

USE2: My intention is to continue using this mobile IM rather than use any alternative means.

USE3: If I could, I would like to discontinue my use of this mobile IM (reversed item).