User Adoption and Loyalty of Location Based Social Network Service in China

Yubo Zhang and Pei-Luen Patrick Rau[*]

Institute of Human Factors and Ergonomics,
Tsinghua University, Beijing, 100084, China
zhangyubo1987@gmail.com,
rpl@mail.tsinghua.edu.cn

Abstract. This study made an investigation of user adoption and loyalty of location based social network service. Regression analysis was conducted to identify the predictors of user adoption measured by intention and frequency according to Innovation Diffusion Theory and the theory of Uses and Gratifications. Personal innovativeness was found to effectively predict future intention. Perceived popularity was found to effectively predict future frequency. Not all five dimensions of perceived innovativeness had equal predicting power to user adoption. Perceived needs proved to effectively predict user adoption measured by both future intention and future frequency. Path analysis showed a structure integrating predictors of e-loyalty together, including trust, satisfaction, flow experience and switching cost. Comparison of continuers, quitters and refusers of LBSNS showed that continuers had higher level of willingness to pursue fashion and behaved more innovative than others. Comparison of three typical LBSNS applications showed a more advantageous position of dedicated LBSNS than SNS and microblog in terms of loyalty.

Keywords: Adoption, loyalty, location-based social network service.

1 Introduction

Location based social network service (LBSNS) is one of the most popular forms of social media. Although there are a big number of adopters of LBSNS, LBSNS did not gain consistent popularity among social media users. Hence, we chose to study the user adoption and its influencing factors of the epidemic check-in behaviors. Besides, there are various ways to check in with mobile phones such as SNS, microblog and dedicated LBSNS. In China, a representative SNS is Renren, which is similar with Facebook. Weibo, which is a translation of microblog in Chinese, is similar with Twitter. Jiepang is a popular dedicated LBSNS which is similar with Foursquare. The three types of LBSNS applications are popular ways to check in. We aimed to study the difference between different ways to check in and what factors influence loyalty of an LBSNS application.

---

[*] Corresponding author.

The burgeoning and declining development process of LBSNS needs to be explained theoretically. So far, studies about user adoption and loyalty of LBSNS are rare. Hence, factors which influence user adoption and loyalty of LBSNS need to be found and the mechanism about how the factors influence user adoption and loyalty of LBSNS needs to be revealed. Besides the theoretical significance, studying user adoption and loyalty of LBSNS also has practical values. The study can provide design implications to improve user experience of existing applications and maintain user stickness.

The objective of this study is twofold. The first one is to find factors which influence user adoption of LBSNS. As a co-product, LBSNS adopters and non-adopters are compared in terms of their personal innovativeness. The second one is to study how factors influence adopters' loyalty of LBSNS. Meanwhile, LBSNS adopters who prefer different applications to check in are compared.

2   Literature Review

In predicting user adoption of new technology or media, previous studies have two theoretical aspects: Innovation Diffusion Theory (IDT) and the theory of Uses and Gratifications (U&G).

IDT was used to explain how personal innovativeness and perceived innovativeness of a new technology influences user adoption [1]. Chang, Lee and Kim [2] used IDT to investigate the relationship between innovativeness and online game adoption and found significantly positive relationship between them. IDT has also been widely used to explain the reason of user adoption such as Facebook [3, 4] and Twitter [5].

There are three constructs in IDT-related studies. The first construct is personal innovativeness. Rogers [6] defined innovativeness as 'the degree to which an individual or other unit of adoption is relatively earlier in adopting an innovation than other members of a social system'. Some studies measured personal innovativeness with perceived behavior control [1], meaning perceived knowledge or ability to use a new technology. Some studies measured personal innovativeness with relative innovativeness [7], which is similar with Rogers' definition of innovativeness. Besides, there were studies measuring innovativeness with fashion and innovative idea [2], meaning users' interest to pursue fashion and innovative idea. The second construct is perceived innovativeness of new technology. Rogers and Shoemaker's five-dimension typology was widely adopted by researchers [8]: relative advantage, compatibility, complexity, trialability and observability. However, there has not been consensus about whether all the five factors consistently predict adoption of social media. Peslak, Ceccucci and Sendall [3] found that four factors except observability were positively correlated with intention to use social network sites while Folorunso, Vincent, Adekoya and Ogunde [4] found that only compatibility and trilability were positively correlated with the attitude of using SNS. The third construct is perceived popularity. It has been proved to positively predict user adoption of online game [2]. In this study, the relationship between the three constructs and user adoption is going to be investigated:

RQ 1: What is the relationship between personal innovativeness and the adoption of LBSNS?

RQ 2: Which of the five dimensions of perceived innovativeness of LBSNS can predict the adoption of LBSNS?

RQ 3: What is the relationship between perceived popularity and the adoption of LBSNS?

As it is indicated in the theory of U&G, users' perceived needs is a primary factor determining and motivating the adoption of media. Previous studies have shown that social media gratifies some unique needs which are different from those gratified by traditional mass media. One study identified six dimensions as gratifications which users obtained from Facebook: pastime, affection, fashion, sharing problems, sociability and social information [9]. Feng once studied user needs gratified by SNS and microblog and found a five-dimension structure including information retrieving, entertainment, self-disclosure, social interactivity and impression management [10]. Lindqvist, Cranshaw, Wiese, Hong and Zimmerman [11] once used the theory of U&G to study why people used Foursquare to share their locations. They summarized the reasons into five dimensions: badges and fun, social connection, place discovery, keeping track of places and game with oneself. Based on the five-dimension model, this study is going to investigate the relationship between perceived needs and the adoption of LBSNS:

RQ 4: What is the relationship between perceived needs and the adoption of LBSNS?

With the development of e-commerce, the concept of loyalty has extended from traditional customer loyalty to electronic customer loyalty (e-loyalty), meaning 'the customer's favorable attitude toward an electronic business, resulting in repeat purchasing behavior' [12]. In studies of SNS, there are two dimensions of e-loyalty: renewal loyalty and referral loyalty. Renewal loyalty indicates users' online stickiness to a certain website and referral loyalty refers to users' intention to recommend a certain brand or product to others. Referral loyalty was proved as a strong signal of loyalty [13].

Trust, satisfaction, flow and switching cost were proved to be significant predictors of e-loyalty. Trust [14-17] and satisfaction [18, 19] have been proved to positively predict e-loyalty of online purchasing. Trust [18] and satisfaction [18, 19] also positively predict e-loyalty of mobile purchasing. Trust was found to positively predict mobile SNS users' e-loyalty [20], and satisfaction was found to mediate trust and loyalty [14, 18]. Flow experience describes people's feelings when they are totally involved in an activity [21]. It was found to positively influence e-loyalty of SNS websites [20, 22]. Previous studies also found that the positive influence of flow experience on e-loyalty was mediated by satisfaction [23, 24]. Since there are multiple choices of LBSNS for users, switching cost from one application to another is an important variable to study. Moderating effect of switching cost on the relationship between perceived value and loyalty [25] was found while in another study significant moderating effect was only found when the level of perceived value was above average [26]. Interestingly, studies about the direct influence of switching cost on e-loyalty did not have consistent findings. Fuentes-Blasco et al. [25] found weak

negative relationship between switching cost and customers' loyalty to B2C websites while other studies found positive relationship in the field of mobile device and service [27-29]. Ng and Kwahk [19] found that switching cost did not significantly influence continuance intention of mobile Internet service. Hence, the relationship between switching cost and e-loyalty of LBSNS needs to be studied. Although trust, satisfaction, flow and switching cost have been studied a lot about e-loyalty, there is not a structure integrating all the factors in the context of LBSNS.

RQ 5: What is the structure of trust, satisfaction, flow and switching cost when they are used to predict e-loyalty of LBSNS?

3   Methodology

A questionnaire survey was conducted to study user adoption and loyalty of LBSNS in China. It was released online and with open access to all Internet users. It was then diffused via Renren, Sina Weibo and Jiepang.

The questionnaire was depicted in Chinese. Before specific questions, a paragraph was presented to describe the concept of LBSNS and there were three check-in applications: Renren, Sina Weibo and Jiepang. Each application was introduced with a paragraph and a check-in screenshot on a smart phone.

The questionnaire consisted of four sections. Section 1 was about respondents' demographic information and section 2 was about their experience of social media and LBSNS. Respondents were categorized into three types: those who still check in now are 'continuers'; those who have checked in before but have stopped now are 'quitters'; those who have never checked in are 'refusers'. Continuers had to answer questions in section 3 and 4. Questions in section 3 were about innovativeness and perceived needs to check in. Thereinto, innovativeness was constructed by personal innovativeness, perceived innovativeness and perceived popularity according to Innovation Diffusion Theory. Among variables constructing perceived needs to check in, the majority of them were from items in the factor analysis and interview results by Lindqvist et al. [11], one variable was from Raacke and Bonds-Raacke's study [30] and one variable was came up with via discussion with research colleagues. Questions in section 4 were about factors which were proved to influence loyalty by previous studies. Besides, continuers had to report their preferred application to check in in section 4. This question was for further comparison on loyalty among respondents who preferred to check in with different applications.

4   Results

In total, there were 196 valid respondents from the online survey. Among them, there were 76 (38.8%) continuers, 45 (23.0%) quitters and 75 (38.3%) refusers. The average age was 23.7 (SD=2.63). There were 104 (53.1%) male respondents and 141 (71.9%) respondents who were students.

4.1   Factors Influencing User Adoption of LBSNS

Personal innovativeness, five dimensions of perceived innovativeness, perceived popularity and perceived needs were regressed on two dependent variables measuring user adoption, future intention to adopt LBSNS and future frequency to adopt LBSNS. Stepwise regression was conducted. The entry level was .05 and the removal level was .10. Personal innovativeness was constructed by seven items, the Cronbach's alpha coefficient was .805; perceived needs was constructed by 20 items, the Cronbach's alpha coefficient was .900.

As shown in Table 1, no matter measured by future intention or future frequency, user adoption was significantly positively predicted by perceived needs. Personal innovativeness only significantly predicted future intention. In the five dimensions of perceived innovativeness, compatibility positively predicted future intention and relative advantage positively predicted future frequency. Perceived popularity only positively predicted future frequency. The total variance explained by the two regression model was 45.0% (F=21.476, p<.001) and 47.8% (F=23.925, p<.001).

Table 1. Stepwise regression on future intention and frequency to adopt LBSNS

Predictor	B	β	t	p
Future intention to adopt LBSNS				
Compatibility	.414	.460	5.084	<.001
Perceived needs	.374	.276	2.942	.004
Personal innovativeness	.263	.221	2.481	.015
Future frequency to adopt LBSNS				
Perceived needs	.572	.390	4.107	<.001
Perceived popularity	.319	.339	3.821	<.001
Relative advantage	.205	.210	2.264	.027

4.2   Comparison among Three Types of Respondents

Three types of respondents were compared in terms of their perceived behavior control, relative innovativeness, fashion, innovative idea.

As shown in Table 2, continuers and quitters had significantly higher level of relative innovativeness and higher willingness to pursue fashion than refusers. No significant difference was found in terms of perceived behavior control and innovative idea among the three types of respondents.

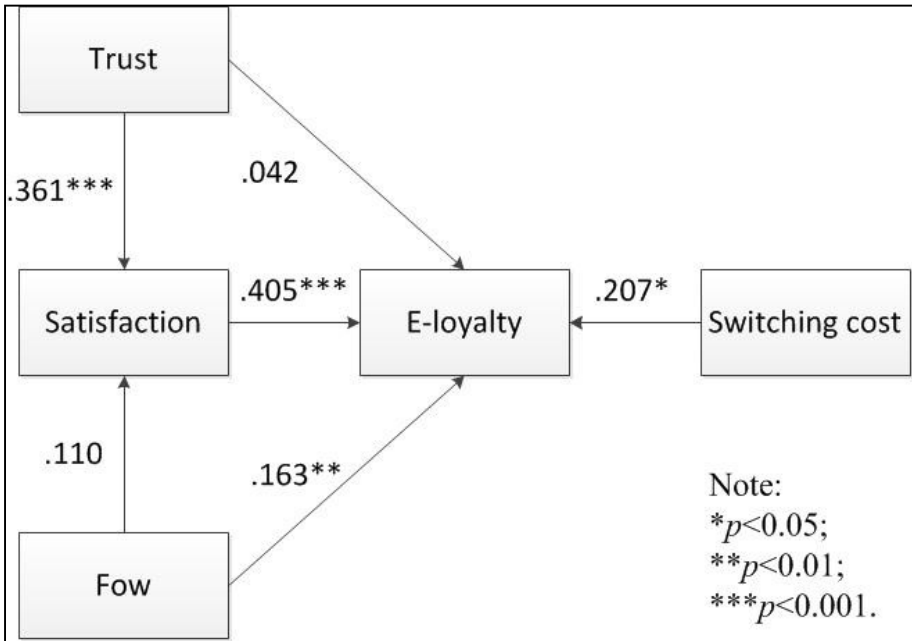## 4.3   Path Analysis of Factors Influencing e-Loyalty of LBSNS

Fig. 1 shows the path analysis of factors influencing e-loyalty of LBSNS. The fitness of this model was χ^2=3.531, GFI=.982, AGFI=.931, RMSEA<.001, which showed that the model had a good fitness.

Under the significant level of <.05, the estimation coefficients of the four factors on e-loyalty were: trust (.361×.405=.146), satisfaction (.405), flow (.163) and switching cost (.207). Satisfaction was a mediator between trust and e-loyalty.

Table 2. One-way ANOVA comparison of personal innovativeness among three types of respondents

Dependent variables	Continuer		Quitter		Refuser		F	p	Multiple comparison
	Mean	SD	Mean	SD	Mean	SD			
Perceived behavior control	4.45	.67	4.43	.55	4.29	.81	1.046	.353	
Relative innovativeness	3.29	.86	3.16	.93	2.59	.95	11.980	<.001	C>R*** Q>R**
Fashion	3.07	.88	3.03	.96	2.50	1.02	7.828	.001	C>R*** Q>R**
Innovative idea	3.74	.98	3.71	.82	3.81	.97	.204	.816	

Note: (1)*p<.05, **p<.01, ***p<.001; (2)C=Continuer, Q=Quitter, R=Refuser.

Fig. 1. Path analysis of factors influencing loyalty of LBSNS

4.4   Comparison among Respondents Who Prefer to Check in with Three Different Applications

Among the 76 continuers of LBSNS, there were 23 respondents who preferred to check in with mobile SNS like Renren, 26 respondents who preferred to check in with microblog like Sina Weibo and 23 respondents who preferred to check in with dedicated LBSNS like Jiepang (there were 4 respondents either leaving the question in blank or selecting the option 'others'). Then a comparison was conducted among respondents who preferred to check in with different applications.

As shown in Table 3, there were significant differences in satisfaction and renewal loyalty among respondents who preferred to check in with different applications. Specifically, respondents who preferred to check in with dedicated LBSNS reported higher level of satisfaction than those who preferred to check in with SNS and Microblog, and respondents who preferred to check in with Microblog reported lower level of renewal loyalty than those who preferred to check in with SNS and dedicated LBSNS.

Table 3. One-way ANOVA comparison among respondents who prefer to check in with three different applications

Dependent variables	SNS		Microblog		Dedicated LBSNS		F	p	Multiple comparison
	Mean	SD	Mean	SD	Mean	SD			
Trust	3.61	.84	3.81	.69	3.91	.51	1.140	.326	
Flow	3.17	.94	2.65	1.09	3.09	.95	1.930	.153	
Satisfaction	3.30	.82	3.38	.70	3.78	.42	3.401	.039	S<D*, M<D*
Switching cost	3.33	.75	3.02	.57	3.28	.69	1.529	.224	
Renewal loyalty	3.61	.66	3.19	.75	3.74	.75	3.885	.025	S>M*, D>M*
Referral loyalty	3.52	.73	3.15	.97	3.70	.76	2.720	.073	

Note: (1)*p<.05, **p<.01, ***p<.001; (2)S=SNS, M=Microblog, D=Dedicated LBSNS.

5   Discussion

The results showed that when user adoption was measured by future intention, the regression coefficient of personal innovativeness was smaller than that of compatibility which is one of the five dimensions of perceived innovativeness, and when user adoption was measured by future frequency, personal innovativeness did not have a significant predicting role to user adoption. This is consistent with Ostlund's opinion that perceived innovativeness is a better predictor of purchase intention than personal characteristic variables [31]. However, the five dimensions of perceived

innovativeness did not have equal predicting roles to user adoption. Compatibility was a better predictor of future intention while relative advantage was a better predictor of future frequency. This result implies that an LBSNS application which complies with users' existing habits or notions has a good chance to gain users' intention to use it. When a user first knows an LBSNS application, if its function model is too far from users' mental model, users may refuse to use it. However, when users have started to use the application, whether or not it has relative advantage over competitive applications is a key factor which influences the continuous adoption.

Besides, perceived popularity was also a significant predictor of future frequency. Like accepting information from family members or friends, the acceptance of LBSNS is influenced by users' social relationship. Schmitz and Fulk [32] support the notion that the social system surrounding an individual can affect the individual's innovation adoption. A person would easily intend to adopt LBSNS if he/she sees family members or friends use it. This phenomenon is described by the construct perceived popularity which turned out to positively predict future frequency. That is, if an individual perceives that LBSNS is popular among friends or the whole society, then the individual will more likely to frequently adopt it in the future.

The theory of U&G proved effective in predicting adoption of LBSNS. Perceived needs was found to significantly predict both future intention and frequency to check in. According to the theory of U&G, needs, uses and gratifications have dynamic reciprocal causality [33]. That is, perceived needs motivate users to use LBSNS and the gratified needs provide feedback for subsequent needs. This is consistent with the result that the coefficient of perceived needs was the largest (.572) when adoption was measured by future frequency to check in.

The structure of trust, satisfaction, flow experience, switching cost and e-loyalty implies that trustworthiness of an LBSNS application does not necessarily predict users' stickness to it. For the design of LBSNS, improving the satisfaction and providing flow experience for users have directer effect on increasing loyalty than improving trustworthiness. This result can set an order of priority if there is trade-off between trustworthiness of information provided by the application and satisfaction or flow experience provided by the application. Satisfaction was an important factor in the aspect of increasing user loyalty of LBSNS not only because of its large estimation coefficient but also because of its mediating role between trust and e-loyalty.

The comparison among three typical check-in applications showed a slightly advantageous position of dedicated LBSNS like Jiepang, whereas in fact Jiepang's development comes across many difficulties. Hence, for applications like Jiepang, their users' loyalty level is high but the problem of their development is that they cannot find a continuous profit model.

6 Conclusion

This study made an investigation of user adoption and loyalty of location based social network service. Regression analysis was conducted to identify the predictors of user adoption measured by intention and frequency. For Innovation Diffusion Theory,

personal innovativeness only significantly predicted future intention to check in and not all the five dimensions of perceived innovativeness had equal predicting power to user adoption. The theory of Uses and Gratifications proved to effectively predict user adoption no matter adoption was measured by intention or frequency. Via path analysis, this study found a structure integrating predictors of e-loyalty together, including trust, satisfaction, flow experience and switching cost. Comparison of continuers, quitters and refusers of LBSNS showed that continuers had higher level of willingness to pursue fashion and behaved more innovative than others. Comparison of three typical LBSNS applications showed a more advantageous position of dedicated LBSNS than SNS and Microblog in terms of loyalty.

Future research can be done with empirical studies to validate the findings in the survey or with field observation to acquire real data to study users' check-in behaviors.

References

1. Ostlund, L.E.: Perceived innovation attributes as predictors of innovativeness. Journal of Consumer Research 1, 23–29 (1974)
2. Chang, B.H., Lee, S.E., Kim, B.S.: Exploring factors affecting the adoption and continuance of online games among college students in South Korea: Integrating uses and gratification and diffusion of innovation approaches. New Media & Society 8, 295–319 (2006)
3. Peslak, A., Ceccucci, W., Sendall, P.: An empirical study of social networking behavior using diffusion of innovation theory. In: Conference on Information Systems Applied Research, Nashville Tennessee, USA (2010)
4. Folorunso, O., Vincent, R.O., Adekoya, A.F., Ogunde, O.: Diffusion of innovation in social networking sites among university students. International Journal of Computer Science and Security 4, 361 (2009)
5. Coursaris, C.K., Yun, Y., Sung, J.: Twitter Users vs. Quitters: A Uses and Gratifications and Diffusion of Innovations approach in understanding the role of mobility in microblogging. In: 2010 Ninth International Conference on Mobile Business and 2010 Ninth Global Mobility Roundtable, pp. 481–486. IEEE (2010)
6. Rogers, E.M.: Diffusion of innovations. Simon and Schuster, New York (1995)
7. Yi, M.Y., Jackson, J.D., Park, J.S., Probst, J.C.: Understanding information technology acceptance by individual professionals: Toward an integrative view. Information & Management 43, 350–363 (2006)
8. Rogers, E.M., Shoemaker, F.F.: Communication of Innovations: A Cross-Cultural Approach. The Free Press, New York (1971)
9. Quan-Haase, A., Young, A.L.: Uses and gratifications of social media: A comparison of Facebook and Instant Messaging. Bulletin of Science, Technology & Society 30, 350–361 (2010)
10. Feng, C.: Research on the Motivation and Behavior Patterns of Social Media Users and Brand Message Content Strategy. Industrial Engineering, vol. Master, p. 224. Tsinghua University, Beijing (2012)

11. Lindqvist, J., Cranshaw, J., Wiese, J., Hong, J., Zimmerman, J.: I'm the mayor of my house: examining why people use foursquare - a social-driven location sharing application. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pp. 2409–2418. ACM, Vancouver (2011)
12. Anderson, R.E., Srinivasan, S.S.: E‐satisfaction and e‐loyalty: A contingency framework. Psychology & Marketing 20, 123–138 (2003)
13. Gronholdt, L., Martensen, A., Kristensen, K.: The relationship between customer satisfaction and loyalty: cross-industry differences. Total Quality Management 11, 509–514 (2000)
14. Chiou, J.S.: The antecedents of consumers' loyalty toward Internet service providers. Information & Management 41, 685–695 (2004)
15. Cyr, D., Head, M., Ivanov, A.: Perceived interactivity leading to e-loyalty: Development of a model for cognitive–affective user responses. International Journal of Human-Computer Studies 67, 850–869 (2009)
16. Ribbink, D., Van Riel, A.C.R., Liljander, V., Streukens, S.: Comfort your online customer: quality, trust and loyalty on the internet. Managing Service Quality 14, 446–456 (2004)
17. Flavián, C., Guinalíu, M., Gurrea, R.: The role played by perceived usability, satisfaction and consumer trust on website loyalty. Information & Management 43, 1–14 (2006)
18. Lin, H.-H., Wang, Y.-S.: An examination of the determinants of customer loyalty in mobile commerce contexts. Information & Management 43, 271–282 (2006)
19. Ee Hong, N., Kee-Young, K.: Examining the determinants of Mobile Internet service continuance: a customer relationship development perspective. International Journal of Mobile Communications 8, 210–229229 (2010)
20. Zhou, T., Li, H., Liu, Y.: The effect of flow experience on mobile SNS users' loyalty. Industrial Management & Data Systems 110, 930–946 (2010)
21. Csikszentmihalyi, M.E., Csikszentmihalyi, I.S.E.: Optimal experience: Psychological studies of flow in consciousness. Cambridge University Press, Cambridge (1988)
22. Qi, Y., Fu, C.: The Effects of Flow and Attachment on the e-Loyalty of SNS Websites. In: 2011 International Conference on Management and Service Science (MASS), pp. 1–6. IEEE (Year)
23. Hsu, C.-L., Chang, K.-C., Chen, M.-C.: The impact of website quality on customer satisfaction and purchase intention: perceived playfulness and perceived flow as mediators. Information Systems and E-Business Management 10, 549–570 (2012)
24. Hsu, C.-L., Wu, C.-C., Chen, M.-C.: An empirical analysis of the antecedents of e-satisfaction and e-loyalty: focusing on the role of flow and its antecedents. Information Systems and E-Business Management, 1–25 (2012)
25. Fuentes-Blasco, M., Saura, I.G., Berenguer-Contrí, G., Moliner-Velázquez, B.: Measuring the antecedents of e-loyalty and the effect of switching costs on website. The Service Industries Journal 30, 1837–1852 (2010)
26. Yang, Z., Peterson, R.T.: Customer perceived value, satisfaction, and loyalty: The role of switching costs. Psychology & Marketing 21, 799–822 (2004)
27. Aydin, S., Özer, G., Arasil, Ö.: Customer loyalty and the effect of switching costs as a moderator variable: A case in the Turkish mobile phone market. Marketing Intelligence & Planning 23, 89–103 (2005)
28. Deng, Z., Lu, Y., Wei, K.K., Zhang, J.: Understanding customer satisfaction and loyalty: An empirical study of mobile instant messages in China. International Journal of Information Management 30, 289–300 (2010)
29. Min, D., Wan, L.: Switching factors of mobile customers in Korea. Journal of Service Science 1, 105–120 (2009)

30. Raacke, J., Bonds-Raacke, J.: MySpace and Facebook: Applying the uses and gratifications theory to exploring friend-networking sites. CyberPsychology & Behavior 11, 169–174 (2008)
31. Ostlund, L.E.: The role of product perceptions in innovative behavior. In: Fall Conference of American Marketing Association, pp. 259–266 (Year)
32. Schmitz, J., Fulk, J.: Organizational Colleagues, Media Richness, and Electronic Mail A Test of the Social Influence Model of Technology Use. Communication Research 18, 487–523 (1991)
33. Wang, Z., Tchernev, J.M., Solloway, T.: A dynamic longitudinal examination of social media use, needs, and gratifications among college students. Computers in Human Behavior 28, 1829–1839 (2012)