

The Influence of Social Presence on Evaluating Personalized Recommender Systems

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Abstract

Providing recommendations is acknowledged as one of important features of a business-to-consumer online storefront. Though there have been many studies on algorithms and operational procedures of personalized recommender systems, there is still a lack of empirical evidence demonstrating relationships between social presence and two important outcome variables of recommender systems: reuse intention and trust.

To test the existence of a causal link between social presence and reuse intention, and mediating role of trust between these two variables, this study performed experiments varying level of social presence while providing personalized recommendations to users based on their explicit preferences. This study also compared these effects in two different product contexts: hedonic and utilitarian product.

The results show that the provision of higher social presence increases both the reuse intention and trust of the recommender systems. In addition, the influence of social presence on reuse intention in the setting of recommending utilitarian products is less than that in the setting of recommending hedonic products.

Keyword: *Personalization, Social presence, Recommender Systems*

1. Introduction

In e-Commerce, many companies want to provide personalized web experiences for their customers to gain their loyalty and increase switching cost. Many studies have suggested ways of product and service recommendations that are based on explicit and implicit preferences of customers. Collaborative filtering is one of the successfully exploited recommendation techniques in various websites and this method predicts user preference by utilizing preferences of similar users [18,27,28].

The recommendation systems make better customer experience and are filling up the customer needs [18]. These systems lessen customers' search effort and increase the customer loyalty by providing relevant product recommendations. In addition, it affects the decision making process for online users [16,27,28,32]. Personalized recommendations are

positively related with the satisfaction of users through perceived social presence in websites [9,23]. That is, the social presence by interacting with the other people and feeling presence of other people affects satisfaction on e-Commerce [16, 27].

However, there have been not many studies for how social presence affects the reuse intention and trust of personalized recommender systems. Thus, the purpose of this study is to investigate the relationships between social presence, trust, and reuse intention of recommender systems. The research questions that we establish are following. First, does that providing users who have similar tastes and in social networks when recommending products causes positive effect to perceived social presence of users? Second, does perceived social presence influences user's reuse intention and trust of recommender systems?

We summarized related studies in section 2, and addressed our research model and hypotheses in section 3. We explained research methodology to test the research hypotheses in section 4 and research results are discussed in section 5. We conclude by discussing theoretical and managerial implications.

2. Literature Review

2.1 Personalized Recommender System

The personalization in website means providing the suitable contents or service segmented each customer's preference [12,18]. This increases customer loyalty or enables target and one-to-one marketing. The purpose of personalization is getting maximum opportunity of companies and lessening search cost of customers [28]. Personalization techniques can be classified whether they are using explicit preference or implicit data.

Collaborative filtering has highly improved the satisfaction of recommendation system because it is based on similarity to each user. This way increases customer satisfaction by user participation in process. Thus, the recommender system using collaborative filtering has effects on user's recommendation satisfaction and trust in the viewpoint of user involvement theory [15].

Through providing the personalized web service, customer can build the more positive satisfaction and trust to providers. Therefore, the

personalization of web experience has perceived critical for e-Commerce [11,12,15].

2.2 Social Presence and Social network

The interaction of customer-provider on the Internet can be achieved by various social cues in site. The social presence consists of intimacy and immediacy [19]. The intimacy means how web users feeling convenience with similar users and the immediacy is psychological degree of distance related how a web user reacts with their similar users. Thus, social presence brings intimacy and immediacy to web users [30]. Therefore, social presence is important in initial stage of user product selection and consideration [31].

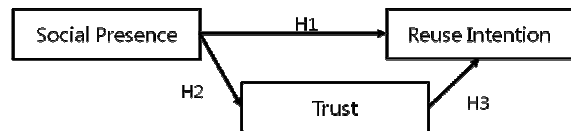
Social network can bring similar effects through interactions between individuals within specific group [23]. Thus, providing the nearest neighbor in social network affect the behavior for the closed people [23]. In short, the individuals that form the social network in real world make the relationship with each other, and their relationships' forms affect the individual behaviors among group members in the Internet. Therefore, for the personalized recommender systems in the web sites, social network can make more influence to web user with social presence [8,16,27].

3. Research Model

The Figure 1 is our research model and shows the relationships between perceived social presence, reuse intention, and trust for recommender systems. The previous studies showed that providing personalized recommendations have effect on decision-making process of customers [2,15,27,32]. In addition, social presence influenced the satisfaction of user by interacting on web [16,24,32]. Recommender systems providing more social presence to users can build stronger user satisfaction.

The preceding study suggested many online stores lack human warmth and emotion. By providing interactions with other online users, the company can increase user's perceived social presence for the company [9]. And this aspect is positively related to reuse intention of customers. Since user experience may be impersonal in the environment without social presence, the amount of information sharing with others will decrease [17]. The recommender systems that have low level of social presence are difficult to get reuse intention of customers. Therefore, social presence has antecedent role for user attitude for recommender systems [9]. Thus, we provide following hypothesis.

H1: Social presence will increase reuse intention for recommender systems of users.



[Figure 1] Research Model

In the study for reuse intention and trust for online users, social presence influenced reuse intention through trust [6,8,9]. Some studies suggested the social presence is one of factors that influence user's interest and trust building [10]. In addition, Gefen and Straub (2003) argued that the richness of social presence can build user trust based on the technology acceptance model [9].

Thus, online stores that are operated with diverse features for providing social presence are able to cause the positive effect for building trust. Thus we provide following hypothesis.

H2: Social presence is positively related with the user's trust for recommender systems.

In previous studies, trust is necessity to satisfaction and user's intention to use [6,7,9,24]. Trust building factors and trust are related to user attitude and purchase [13]. In addition, the study for customer acceptance on e-commerce suggested that trust can be related to build reuse intention [22] and trust plays the role of building the user purchase intention [8,14]. Thus, trust is the factor that influences user's intention to use of recommender systems.

H3: Trust for recommender systems is positively related with reuse intention for recommender systems.

4. Methodology

This study conducted experiments for two product categories such as utilitarian and hedonic to find out the difference of user perceptions for the two product categories. To perform the experiments, this study selected ring-tones as hedonic products and TOEIC study-aid books as utilitarian products.

Top 30 popular items from bestseller lists of Nate.com for ring-tones and Yes24.com for TOEIC study-aid books were used for the experiments.

50 raters entered their preference scores in seven Likert-scale for the selected 30 items for ring-tones and TOEIC study-aid books in first stage. A participant rated their preference for 10 items, then the participant saw one of four different recommendation result pages as described in Table 1.

Table 1. Four different recommendation groups

| Group | Description |
|-------|--|
| A | - Items which got highest scores by other users |
| B | - Recommendation results provided by user-to-user collaborative filtering |
| C | - Recommendation results provided by user-to-user collaborative filtering - User list who have expressed similar preferences |
| D | - Recommendation results provided by user-to-user collaborative filtering - User list who have expressed similar preferences - A list of social network members who have expressed similar preferences |

Recommendation results for group A, B, C and D were selected among remaining 20 items that were not rated by survey participants. The survey participants who were assigned group D should checked their friends among the 50 raters before they rated their preferences on items.

After the survey participants saw recommendation results, they should answer questionnaires that were composed of 11 items in seven Likert-scale (3 items for Reuse intention, 3 items for Trust, and 5 items for Social Presence). All items used in questionnaires are derived from previous studies.

The collected data were analyzed using Exploratory Factor Analysis (EFA) to check each dimension, and then convergent validity and discriminant validity were evaluated through confirmatory factor analysis (CFA). Items are loaded significantly on their intended constructs, suggesting convergent validity. Meanwhile, covariances between each construct were not included confidence interval ($\Phi \pm 2S.E$) as suggested [1]. As a result, discriminant validity was also supported between each construct.

After testing the validity, reliability test was conducted by internal consistency test (Cronbach's α). At last, this research conducted ANOVA and Structural Equation Modeling (SEM) to verify the proposed research model.

Table 2. EFA Result

| Proposed Dimensions | | Extracted Dimensions | |
|---------------------|---------|----------------------|------------------|
| Dimensions | Items | Factor Loading | Cronbach's Alpha |
| Social Presence | SP1 | 0.911 | 0.876 |
| | SP2 | 0.734 | |
| | SP3 | 0.936 | |
| | SP4 | 0.874 | |
| Reuse Intention | Intent1 | 0.432 | 0.753 |
| | Intent2 | 1.040 | |
| | Intent3 | 0.428 | |
| Trust | Trust1 | 0.826 | 0.911 |
| | Trust2 | 1.014 | |
| | Trust3 | 0.924 | |

The population was customers with online purchasing experience, and a sample is composed of 248 undergraduates who were volunteered for the experiment and they had 30% probability to get a gift worth 3,000 Korean Won.

Participants who were assigned Group A, B, and C are randomly selected by the survey system we made at least 30 people for each group. We recruited Group D's participants since they should have social network relationship with 50 raters who rated all items at first stage.

This study checked validity for each dimension; social presence, trust, and reuse intention through two stages. The first stage is to check construct validity using EFA. The second stage is to confirm the identified factors using CFA by checking convergent validity and discriminant validity.

Table 2 summarizes the result of EFA and shows that this study has construct validity. After EFA, one item in social presence was deleted because it was difficult to explain due to incorrect loading. In addition, this study has reliability since Cronbach's alpha values for all dimensions are at least 0.7.

5. Result

Table 3 shows the difference of perceived social presence among the experiment groups. Manipulation of perceived social presence was checked.

Table 3. ANOVA result

| Type | Group | N | Mean | Order | F | Sig. |
|-----------|-------|-----|-------|-------|------|-------|
| All | A | 62 | 3.032 | 4 | 9.22 | 0.000 |
| | B | 62 | 3.629 | 3 | | |
| | C | 63 | 3.857 | 2 | | |
| | D | 61 | 4.053 | 1 | | |
| | Total | 248 | 3.642 | | | |
| Ring tone | A | 32 | 2.906 | 4 | 6.83 | 0.000 |
| | B | 30 | 3.708 | 3 | | |
| | C | 30 | 4.092 | 1 | | |
| | D | 31 | 4.048 | 2 | | |
| | Total | 123 | 3.590 | | | |
| TOEIC | A | 30 | 3.167 | 4 | 2.94 | 0.014 |
| | B | 32 | 3.555 | 3 | | |
| | C | 33 | 3.644 | 2 | | |
| | D | 30 | 4.058 | 1 | | |
| | Total | 125 | 3.500 | | | |

The test result of the proposed model was presented in Figure 2. The fit measures of the proposed model are acceptable (GFI=0.94, AGFI=0.89, NFI=0.96, RMSEA=0.07, CFI=0.97).

The path coefficient of H1 was appeared as 0.260 (p=0.011). Thus, H1 was supported that social presence influences reuse intention. The relationship between social presence and trust (H2) was supported because the path coefficient was 0.901 (p=0.000). Reuse intention of users through trust

(H3) was also supported since the path coefficient is 0.639 (p=0.000). Thus, trust is appeared to have stronger effects on reuse intention for recommender systems than social presence. However, social presence also affects reuse intention of recommender systems.

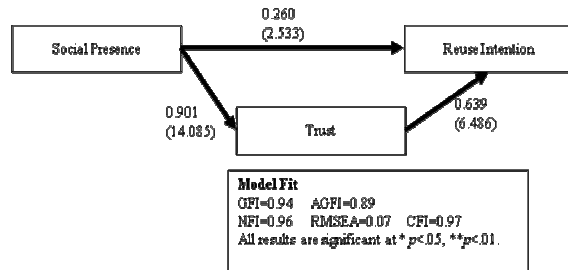


Figure 2. Test result for the proposed model

Table 4 summarizes the results of hypotheses test.

Table 4. Summary of SEM result

| | Model | Result |
|----|--------------|-----------|
| H1 | SP→Intent | Supported |
| H2 | SP→Trust | Supported |
| H3 | Trust→Intent | Supported |

Our experiments were done for the two different product categories as ring-tones and TOEIC study-aid books. Thus, we compared the difference of the proposed model between two product categories. In Table 5, test results for ring-tones and TOEIC study-aid books were similar to the results of all products. While the path coefficient between social presence and reuse intention was significant in ring-tones as 2.694 (p=0.007), that was not significant in TOEIC study-aid books as 0.785 (p=0.432).

Table 5. The coefficients of paths

| Path | Product | Estimate | S.E. | T | Sig. | |
|------------------|----------|----------|-------|--------|-------|------|
| SP →Trust | Ringtone | 0.855 | 0.090 | 9.479 | 0.000 | |
| | TOEIC | 0.962 | 0.091 | 10.527 | 0.000 | |
| SP →Intent | Ringtone | 0.373 | 0.138 | 2.695 | 0.007 | |
| | TOEIC | 0.123 | 0.157 | 0.785 | 0.432 | |
| Trust →Intent | Ringtone | 0.485 | 0.133 | 3.663 | 0.000 | |
| | TOEIC | 0.800 | 0.148 | 5.411 | 0.000 | |
| Fit measure | GFI | RMSEA | AGFI | NFI | CFI | |
| | Ringtone | 0.90 | 0.09 | 0.83 | 0.93 | 0.96 |
| | TOEIC | 0.91 | 0.09 | 0.84 | 0.94 | 0.97 |

Therefore, we found the different effect between two product types - Hedonic and Utilitarian. As well as the research model contained all samples, the test result for the research model with only ring-tone has same effect for all paths. However, the test result for the research model with only TOEIC study-aid books has no relationship between social presence and reuse intention for recommender systems while other paths are significant.

6. Conclusion

This research shows social presence has effects on customer trust and reuse intention when they interact with recommender systems. Theoretical contribution of this study can be addressed as follows.

First, the social presence affects trust and reuse intention for recommender systems and trust has stronger positive effects on reuse intention than social presence has. Thus, social presence affects reuse intention of user for recommender systems directly, and also affects reuse intention indirectly through trust.

Second, providing similar users (Group C) and users in social network as presenting preference information of the real friends (Group D) have effects on the perceived social presence of users.

Third, user responses on different product types suggested as utilitarian and hedonic showed different results about the relationship between social presence and reuse intention. While relationships between social presence and trust/trust and reuse intentions are significant, the effect of social presence on reuse intention is not significant when we recommend TOEIC study-aid books. We can interpret this result that consumers consider other users opinions less when they deal with utilitarian products than they deal with hedonic products.

But the role of social presence for trust is significant in all settings. Therefore, in online environment, social presence is motivating acceptance of users and will make recommender systems more trustable.

This study has a few limitations. First, our sample was only undergraduates. Thus, the future study must be performed with participants in diverse age ranges. Second, this study conducted with simple product types. In each product category – hedonic and utilitarian, if study conducted more products in same product type, the effects of constructs on recommender systems will be profound.

However, this study showed importance of social presence in personalized recommender systems. Managers of online stores that provide personalized recommendations should concern about feeling social presence in the interactions of recommendation systems to make the systems more trustable. The reuse intention of users is important for many online storefronts and personalized recommender systems.

References

[1] Anderson, J.C. and Gerbing, D.W. (1998), "Structural Equation Modeling in Practice: A review and

- Recommended two-step approach,” *Psychological Bulletin*, Vol.103, Issue 3, pp. 411-423.
- [2] Awad N.F. and Krishnan, M.S. (2006). “The Personalization Privacy Paradox : An Empirical Evaluation of Information Transparency and the Willingness to be Profiled Online for Personalization,” *MIS Quarterly*, Vol. 20, No. 1, pp. 13-28.
- [3] Blom, J.O. and Monk, A.F. (2003). “Theory of Personalization of Appearance: Why Users Personalize Their PCs and Mobiles Phones,” *Human-Computer Interaction*, Vol. 18, pp. 193-228.
- [4] Corbitt, B.J., Thanasankit, T. and Yi, H. (2003). “Trust and e-commerce: a study of consumer perceptions,” *Electronic Commerce Research and Applications*, Vol.2, No.3, pp. 203-215.
- [5] Doney, R.M. and Cannon, J.P. (1997). “An Examination of the Nature of Trust in Buyer-Seller Relationships,” *Journal of Marketing*, 61(April), pp. 35-51.
- [6] Garbarino, E. and Johnson, M.S. (1999). “The Different Role of Satisfaction, Trust, and Commitment in Customer Relationships,” *Journal of Marketing*, 63(April), pp. 70-87.
- [7] Ganesan, S. (1994). “Determinants of Long-Term Orientation in Buyer-Seller Relationships,” *Journal of Marketing*, 58(April), pp. 1-19.
- [8] Gefen, D. (2000). “E-Commerce: the role of familiarity and trust,” *Omega*, Vol.28, pp. 725-737.
- [9] Gefen, D. and Straub, D.W., (2003). “Managing User Trust in B2C e-services,” *e-Service Journal*, Vol. 2, No. 2, pp.7-24.
- [10] Hassanein, K. and Head, M.(2005), “The Impact of Infusing Social Presence in the Web Interface: An Investigation Across Product Types”, *International Journal of Electronic Commerce*, Vol.10, No.2, pp.31-55.
- [11] Ho, S.Y. and Kwok, S.H. (2003). “The Attraction of Personalized Service for Users in M-Commerce,” *ACM SIGecom Exchanges*, Vol. 3, No. 4, January 2003, Pages 10-18.
- [12] Ho, S.Y. and Tam, K.Y. (2005). “An Empirical Examination of the Effects of Web Personalization at Different Stages of Decision Making,” *International Journal of Human-Computer Interaction*, Vol. 19, No. 1, pp. 95-112.
- [13] Jarvenpaa, S.L., Tractinsky, N. and Vitale, M.(2000), “Consumer Trust in an Internet Store”, *Information Technology and Management* 1, pp.45-71.
- [14] Knight, D., Noble, F., Vurdubakis, T. and Willmott, H.(2001), “Chasing Shadows: Control, Virtuality and Producer of Trust”, *Organization Studies*, Vol.22, No.2, pp.311-336.
- [15] Komiak, S.Y.X. and Benbasat, I. (2006). “The Effects of Personalization and Familiarity on Trust and Adoption of Recommendation Agents,” *MIS Quarterly*, Vol. 30, No. 4, pp.941-960.
- [16] Kumar N. and Benbasat I. (2006). “The Influence of Recommendations and Consumer Reviews on Evaluations of Websites,” *Information Systems Research*, Vol. 17, No. 4, pp. 425-429.
- [17] Leh, A.S.(2001), “Computer-Mediated Communication and Social Presence in a Distance Learning Environment”, *International Journal of Educational Telecommunication*, Vol.7, No.2, pp.109-128.
- [18] Liang, T., Lai, H. and Ku. Y. (2007). “Personalized Content Recommendation and User Satisfaction : Theoretical Synthesis and Empirical Findings,” *Journal of Management Information Systems*, Vol. 23, No. 3, pp.45-70.
- [19] Lombard, M. and Ditton, T. (1997). “At the Heart of it all: The Concept of Telepresence,” *Journal of Computer Mediated Communication*, Vol.3, No.2, Sep.
- [20] Mattila, A. (2005). “Relationship between Seamless Use Experience, Customer Satisfaction and Recommendation,” *Problems and Perspectives in Management*, Vol 1, pp. 96-108.
- [21] Morgan, R.M. and Hunt, S.D. (1994). “The Commitment-Trust Theory of Relationship Marketing,” *Journal of Marketing*, Vol.58, July, pp.20-38.
- [22] Pavlou, P.A.(2003), “Consumer Acceptance of Electronic Commerce: Integrating Trust and Risk with the Technology Acceptance Model”, *International Journal of Electronic Commerce*, Vol.7, No.3, pp.101-134.
- [23] Shardanand, U. and Mases, P. (1995). “Social Information Filtering: Algorithms for Automating ‘Word of Mouth’,” *Human factors in computing systems; CHI '95 conference proceedings*, pp.210-217
- [24] Sheizaf R. and Avi N. (2005). “Social Presence: Influence on Bidders in Internet Auctions,” *Electronic Markets*, Vol. 15, No.2, pp.158-175.
- [25] Sinha, R. and Swearingen, K. (2001). “Comparing Recommendations made by Online Systems and Friends,” *In Proceedings of the DELOS-NSF Workshop on Personalization and Recommender Systems in Digital Libraries*.
- [26] Singh, J. and Sirdeshmukh, D. (2000). “Agency and Trust Mechanisms in Consumer Satisfaction and Loyalty Judgements,” *Journal of the Academy of Marketing Science*, Vol.28(1), pp. 150-167.
- [27] Tam, K.Y. and Ho, S.Y. (2005). “Web Personalization as a Persuasion Strategy: An Elaboration Likelihood Model Perspective,” *Information Systems Research*, Vol.16, No.3, pp.271-291.
- [28] Tam, K.Y. and Ho, S.Y. (2006). “Understanding the Impact of Web Personalization on User Information Processing and Decision Outcome,” *MIS Quarterly*, Vol. 30, No. 4, pp. 865-890.
- [29] Tu, C. H. (2002). “The impacts of Text-based CMC on Online Social Presence,” *Journal of Interactive Online Learning*, Vol. 1, No. 2, pp.1-24.
- [30] Wang L. C, Baker, J., Wagner J. A. and Wakefield K., (2007). “Can a Retail Web Site Be Social?,” *Journal of Marketing*, Vol. 71, pp.143-157.
- [31] Wang, S., Beatty, S. E. and Foxx, W. (2004). “Signaling the Trustworthiness Of Small Online Retailers,” *Journal of Interactive Marketing*, Vol.18, No.1, pp. 53-69.
- [32] Wang, W. and Benbasat, I. (2007). “Recommendation Agents for Electronic Commerce: Effects of Explanation Facilities on Trusting Beliefs,” *Journal of Management Information Systems*, Vol. 23, No. 4, pp. 217-246.