Antecedents and Moderation Effect of Product Involvement on Recommendation Trust

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ABSTRACT

This study aims to identify which social information have significant influence on the improvement of recommendation trust and how these effects can be different according to the product involvement level. We conducted online survey from 55 respondents 205 trust relationships (links)and tested candidate antecedents which are chosen from previous literature. It is found that closeness, similarity, sincerity and reputation significantly affect the recommendation trust. Moreover in our analysis, moderation effect of product involvement level between the recommendation trust and antecedents of closeness and reputation is significant.

Key words: Antecedents, Product Involvement, Recommendation Trust, Recommender, Social Recommender System, Social Relation

1. INTRODUCTION

Making decision is not easy for internet surfer to buy or view something via online or offline due to plentiful of information. When a customer want to search movies or to buy a product, the huge information comes at hand that need to be considered before making a choice. Recommendation system can assist users to make a choice easier under the information overload. Recommendation system in form of collaborative filtering (CF)was first advent in commercial use in the mid 90's by amazon.com for its book recommendation, which made a remarkable age of recommendation. The CF-based recommendation system has been built under the assumption of 'birds of a feather flock together'. This means CF-based recommendation system has been successful by recommending based on a similarity relationship among users in their tastes.

However, it is shown the rapid growth of social network community with the explosion of mobile devices. These social networks provide plentiful social information among users such as closeness, sincerity and reputation as well as similarity. Social information is defined as information of user relationships as well as user characteristics which can be obtained implicitly or explicitly from social network service in this context. Social networks not only make it easier for users to share their opinions with each other, but also serve as a platform for improving the quality of recommendation system by providing various social information. Recently, there are increasing attempts to improve the quality of recommendation by utilizing various social information with the activation of social networks in the research field of recommender system. A number of recommender studies report that the additional use of social information contributes to improve recommendation quality [Kim et al., 2011; Zheng and Li, 2011; Carrer-Neto et al., 2012; Neto and Nowe, 2012; Avesani et al., 2004; Li and Kao, 2009]. On the other hands, there are also negative opinions that additional use of social information does not contribute meaningfully to improve recommendation quality [Golbeck et al., 2006; Neto and Nowe, 2012]. Arazy et al. [2009], Ricci et al. [2011] and Neto and Nowe [2012]pointed out that there are no consensus among researchers in recommendation field on how much recommendation quality can be improved by utilizing additional social information in recommender systems. The conflicting opinions on the recommendation quality of recommender which utilize social information are mainly due to the different experimental condition and method. The experimental outcomes on recommendation quality can be different because most studies report the quality of their recommender within a certain product or category when they build it. Mixed opinions also can be reported because researchers utilize different types of social information when they build recommendation system as well as adopt different methods on how to utilize social information. Therefore, it is hard to generalize the effect of social information on recommendation quality judging from the previous recommendation system research.

The main objective of this study is to identify which social information have significant influence on the improvement of recommendation trust and how these effects can be different according to the product involvement level. If we could build a recommender system based on the social information, it could improve the recipient trust on recommendation and it would ultimately increase the quality of recommendation. Finally, this study aims to generalize the effect of social information on recommendation trust based on the survey and empirical test. On the basis of our objective, we try to find the answers of the following questions. First, what are the antecedents of recommendation trust? Second, how these effects on recommendation trust of social information can be different according to the product involvement level? The results of this study can be applied usefully to e-commerce companies for developing new social recommender systems with considering identified social information in a different product involvement level. Large organizations may also benefit from the results if they are planning to introduce integrated social recommender systems. This paper is organized as follows. Section 2 presents background research and a review of the literature related to recommendation trust and its antecedents. The model development, variables declaration and illustration of variables and hypotheses development are described in section 3. The core components of this paper are described in section 4 with the instrument development, data collection and the research findings. Finally, section 5 addresses research contribution, research limitations and future research.

2. BACKGROUND RESEARCH

Trust is a dynamic topic that studied in many disciplines, including sociology, psychology, economics, management, and computer science. In this study, trust is defined as one's willingness to rely on another's actions in a situation involving the benefits of accepting the recommender information [Mayer et al., 1995]. This conceptualization of trust, which is also known as trust intentions [Lee et al., 2011] and trustworthiness [Edelman, 2011], is based on a set of beliefs that others upon whom one depends will behave in a socially acceptable manner [Constantinides et al., 2010] by showing appropriate integrity, benevolence, and ability. Trust is a prerequisite of social behavior, especially regarding important decisions [Edelman, 2011]. In this study, we use trust as the perceived trust of recipient on recommended information in a recommendation seeking environment. Recommendation trust depends on different kinds of social relationships and characteristics of recommender. People may be able to form a general opinion about how much they trust others, but it would be more accurate and specific to break down the trust according to the product category. We may trust a friend for a movie, but not for a technological product.

2.1. Antecedents of Recommendation Trust

A number of trust antecedents have been identified from the previous studies. These factors also can be good candidates of antecedents for recommendation trust. Antecedents which affect to form trustworthy is summarized in Table 1. Mayer et al. [1995] and Lee et al. [2011] described that both characteristics of the trustee and the trustor are very important to achieve and maintain long-term trust. They chose ability, benevolence, and integrity of the trustee as antecedents of trust and insisted that trusting behaviors will lead to update prior perceptions of those factors. Butler [1991] identified a number of factors when they tried to measure managerial trust and those were availability, competence, consistency, discreetness, fairness, integrity, loyalty, openness, promise fulfillment, and receptivity. Butler and Cantrell [1984] studied determinants of trust between boss and subordinates and compared relative importance among determinants based on the behavioral decision making. As a result, it is found that integrity, competence, and consistency are more important determinants for trust than loyalty and openness. Gilly et al. [1998] studied and concluded that both the sources and seekers of knowledge, expertise, credibility and perceptual

Table 1: Antecedents of trust from existing studies	
Related studies	**Antecedents of trust**
Lee et al. [2011]	Ability, benevolence, integrity
Butler [1991]	Availability, competence, consistency, discreetness, fairness, integrity, loyalty, openness, promise fulfillment, and receptivity
Butler and Cantrell [1984]	Integrity, competence, consistency, loyalty, openness
Cook and Wall [1980]	Trustworthy, intentions, ability
Gilly et al. [1998]	Expertise, homophily, opinion leadership
Guy et al. [2009]	Similarity, familiarity
Iacobucci and Hibbard [1999]	Similarity, power, personality factors, competence, communication, social closeness
Giffin [1967]	Expertness, reliability as information source, intentions, dynamism, personal attraction, reputation
Larzelere and Huston [1980]	Benevolence, honesty
Mayer et al. [1995]	Ability, sincerity, integrity, trust propensity

and demographic homophile are very influential for word of mouth on actual purchase behavior. Iacobucci and Hibbard [1999]studied on business marketing relationships and found that similarity, balanced power, personality factors, competence, communication and social closeness are crucial for long-term business to customers relationships. Giffin [1967]suggested expertness, reliability as information source, intentions, dynamism, personal attraction, reputation as factors that leads to trust. Larzelere and Huston [1980]also studied the behavioral characteristics that leads to trust of a person to others.

Finally, we chose four types of social information which are commonly included in previous studies as candidate antecedents of recommendation trust: closeness [Iacobucci and Hibbard, 1999; Kelley et al., 1983; Levin and Cross, 2004], similarity [Gilly et al., 1998; Guy et al., 2009; Iacobucci and Hibbard, 1999], sincerity [Lee et al., 2011; Lewicki and Bunker, 1995; Mayer et al., 1995]and reputation [Mayer et al., 1995; Lee et al. 2011; Gilly et al., 1998; Giffin, 1967]. We selected these factors because the others cannot be collected implicitly or explicitly by identifying the history of user activity and social interaction from various social networks or domain created networks.

2.2. Product Involvement

Product involvement level is the degree of information processing and the amount of importance a consumer attaches to a product while purchasing it. In other words, it shows how much the customer is involved towards a product personally, socially and economically when he or she buys something. Products or services can be divided into two categories according to the time, efforts and money when consumers want to spend to buy: high involvement product and low involvement product [Ferreira and Coelho, 2015; Hong, 2015; Gutierrez, 2010]. High involvement products are those that represent the consumer's personality, status and justifying lifestyle. They involve a high level of risk in the process of buying decision and are most probably expensive. Examples of high involvement products are car, computer, diamond, house, etc. We choose a computer for an example of high involvement product. By contrast, low involvement products are those that reflect routine purchase decisions. These products involve a low level of risk or no risk in the process of buying decision and they are inexpensive most of the times. Generally, consumers buy these products without thinking or planning. Examples of low involvement products are movies and music from an online vendor. For our study, we choose a movie as an example of low involvement product. Our objective is to investigate moderating effect of product involvement as well as identifying antecedents of recommendation trust.

3. RESEARCH MODEL AND HYPOTHESIS

We chose four kinds of social information including closeness, similarity, sincerity and reputation as antecedents for the recipient trust on recommendation. The close relationship is one of strong, frequent and diverse interdependence that lasts over a considerable period of time [Kelley et al., 1983]. Examples of such relationships are friendships, serious love affairs, marriages, and parent-child relations. Close relationships are commonly believed to be characterized by strong positive emotion and high affective involvement. Sinha and Swearingen [2001]compared the quality of recommendations made by recommender systems and reported that users preferred recommendations from friends. Considerable evidence indicates that individuals with more close relationships obtain more social resources [Granovetter, 1973]. In the early days of the internet, identifying the close friend of a user was difficult. But nowadays, social networking web sites make it easy to extract friendship information. A social network is typically represented as a graph, with individual persons represented as vertices, the relationships between pairs of individuals as edges, and the strengths of the relationships represented as the weights on edges [Okamoto et al., 2008]. In our real world, people who are more closely connected have more influence on each other's opinions. The recipient trust on recommended information will be higher if the relationship between source and recipient is closer. If we could extract friendship information and build a recommender system based on the closeness information, it could improve the recipient trust on recommendation and it would ultimately increase the quality of recommendation. Therefore if both the recommender and the recommendee have close relationship then the trustworthiness of the recommendations increases considerably. On the other hand, effects on the recipient trust about recommendation of closeness will be different according to the product involvement level. We assume that the recommendation from closer people is more trustworthy in case of recommending low involvement products than high involvement products. It is commonly noticed that many individuals want to buy same item which is already bought by friends when it is low involvement product. Customers have tendency to experience services which are told and experienced by friends when they are not considerably high price. But for the high involvement product case, imitative buying is not a simple decision because of limited money and effort. Therefore we hypothesize:

H1: Perceived closeness of recommendee on recommender is positively related to the recommendation trust of recommendee.
H2: Perceived closeness of recommendee has a stronger positive effect on recommendation trust in case of recommending low involvement products than high involvement products.

Similarity often termed as homophily [Gilly et al. 1998]. Traditional social recommender systems based on collaborative filtering associate a recipient with sources based on the degree to which their consumption profiles are similar [Shardanand and Maes, 1995]. In collaborative filtering, a rating of target item for target user can be predicted using a combination of the ratings of the neighbors of a similar users that are already familiar with item [Resnick et al., 1994]. Bonhard et al. [2006]used profile similarity by demographic data, interest and taste and experimented it in movie recommendation. As a result, they found a significant improvement of recommender system. Similarity could also have a direct impact on the recipient trust on recommendation, even with very limited social interaction. Persons tend to trust others who are similar to each other by their behavior or taste. We think that there are strong positive relationships between similarity and recommendation trust of recommendee. Therefore we hypothesize:

H3: Perceived similarity of recommendee on recommender is positively related to the recommendation trust of recommendee.

A Sincere person is one who is eager to do what is right with honesty and transparent motives. Recommender's characteristics of sincerity have a significant impact on interpersonal trust [Lewicki and Bunker, 1995]. Research suggests that when a source's past communications are truthful, receivers are more likely to rely on current communications from that source. The concept of sincerity is intrinsic value and hard to measure but it is usually exposed by behavior. Whitener et al. [1998]insisted that long term and consistent behavior leads to form trust for counterparties because it makes others predictable and transparent. Long term and consistent behavior represents high level of sincerity of recommender. Recommender characteristics of sincerity is the determinant of the recipient trust on recommended information. If the recommender is sincere to the recommendee then recommendation trust would be very high. Therefore we hypothesize:

H4: Perceived sincerity of recommendee on recommender is positively related to the recommendation trust of recommendee.

Reputation is what is generally said or believed about a person's character or standing. Many social network and P2P site build reputation system for their customers to give information of trust about unknown countparties. The basic idea is to let parties rate each other after the completion of a transaction and use the aggregated ratings about a given party to derive a trust or reputation score, which can assist other parties in deciding whether or not to transact with that party in the future. A recommender's reputation has been shown to affect the recommendee's decision making process. A person's reputation represents his or her ability and expertise to influence others, and stems from that person's structural positioning in the social network. We think that the reputation of recommender is another important determinant of the recipient trust on recommendation. In particular, recommendee would strongly rely on recommender's reputation in case of buying high involvement products. Information seekers tend to trust information from experts, experienced and knowledgeable recommender when they confronted with serious decision. Hence we hypothesize:

H5: Perceived reputation of recommendee on recommender is positively related to the recommendation trust of recommendee.
H6: Perceived reputation of recommendee on recommender has a stronger positive effect on recommendation trust in case of recommending high involvement products than low involvement products.

Figure 1 represents proposed research model in this study.

4. DATA ANALYSIS

Table 2 represents how to measure each construct which are shown in research model by reviewing related studies. We have developed a questionnaire having a total of 27 questions. Among these questions, 24 questions are related with each construct and three general questions are related with respondent characteristics. The respondents are asked to imagine the situation of purchasing a movie ticket or a computer. We asked the respondents to write the name of two friends whom they would like to receive recommendation most or least when they need to buy movie or computer before we ask questions to measure each
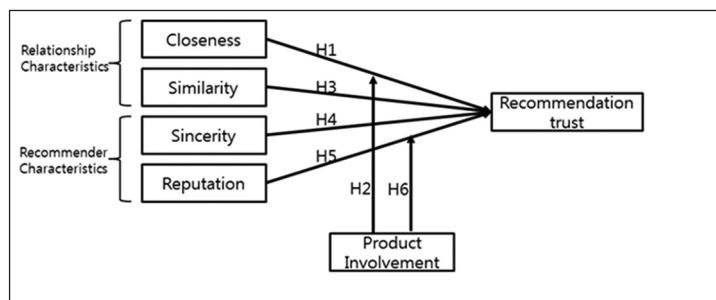

Figure 1: Research model

construct. All questions are designed on a five-point Likert scale ranging from 1 (strongly disagree)to 5 (strongly agree). We have collected 240 trust relationships (links)from 60 respondents by using Google Docs. Dishonest and biased answers are removed among the collected responses. Finally, we have prepared 205 trust relationships (links)from 55 valid respondents.

Reliability assessment is carried out with Cronbach's alpha test by using SPSS software to ensure the internal consistency of each construct. Generally, alpha coefficient ranges in value from 0 to 1 and only positive values make sense. If the value of Cronbach's alpha is greater than 0.6, we can conclude the internal consistency of the construct is reliable. As shown in Table 3, the values of Cronbach's alpha for all constructs are higher than 0.7 (0.922 for trust, 0.921 for reputation, 0.789 for sincerity, 0.920 for closeness, 0.921 for similarity). Since the internal consistency coefficient of Cronbach's alpha for all of the research variables are above 0.7, the reliability of this research constructs is highly supported.

In order to test the validity of research constructs, we have used principal component analysis with Varimax rotation to extract the factors (see Table 4). For each data set, 5 stable factors (with all the values greater than 0.5)are emerged. The question loadings for the construct of trust, reputation, sincerity, similarity and closeness exceeded 0.5, indicating adequate validity. The rotated component matrix for all four questions loading for each construct with 5 factors are extracted and all of these values are greater than 0.5. Therefore we can conclude that the internal validity of our research constructs statistically valid.

The hypotheses were tested using multiple regression analysis with the VIF (Variance Inflation Factor). We have measured the recommendation trust and the antecedents independently and try to examine the linear relationships. VIF measures how much the variance of an estimated regression coefficient is increased because of collinearity. It is recommended that VIF value should be less than 2 to avoid the collinearity. Table 5 shows the VIFs for all variables (reputation 1.656, sincerity 1.410, closeness 1.327 and similarity 1.889)are less than 2. All the p-values on regression coefficient are less than significance level 0.05 (reputation: 0.000, sincerity: 0.000, closeness: 0.04, similarity: 0.000). Therefore hypothesis H1, H3, H4, H5 are supported.

According to the standardized beta coefficient in Table 5, the most important antecedent for recommendation trust is reputation. This means recipient's perceived trust on recommendation is influenced more strongly by reputation than any other antecedents. To test the hypotheses H2 and H6, we have used hierarchical regression analysis to measure the moderation effects of product involvement level as shown in Table 6.

Table 2: Measurement of construct			
Construct	**Measurement item**	**References**	**Question no.**
Recommendation trust	-Trust on product information -Willingness to share recommended information -Acceptance of risk by sharing information -Trust not to recommend wrongly	-Mayer, Davis, and Schoorman[1995] -Lee et al., [2007] -Sitkin and Pablo (1992) -McKnight and Chervany[2002] -Genfen[2003]	1-8 (1~4 for movie, 5~8 for computer)
Reputation	-Knowledge on the product -Experience on the product -Providing useful information on the product -Influential on the product	-Massa &Avesani[2004] -Gilly et al. [1998], -Arazi et al.[2010]	9-12
Sincerity	-Consistent behavior -Active behavior -Diligence -Faithfulness	-Zaltman and Moorman[1988] -Mayer, Davis, and Schoorman[1995] -Tan and Tan[2000]	13-16
Closeness	-Long time communication -Close friendship -Easiness to talk -Response on conversation	-Goldberg et al.[1992] -Kautz et al.[1997] -Massa and Avesani[2004] -Arazi et al.[2010] -Kelley, Harold H., et al [1983]	17-20
Similarity	-Similar tastes on the product -Like together on the product -Like to have similar product -Need to have same product	-Shardanand and Maes[1995] -Doney and Cannon[1997] -Iacobucci and Hibbard[1999] -Arazi et al.[2010] -Kosmidis and Bunde[2007]	21-24
Respondent characteristics	Gender Categoty of age Usage frequncy of SNS		25-27

Table 3: Research construct, measurements and reliability assessment		
Construct	**Measuring question**	**Cronbach-alpha**
Trust	1. Trust on product information	0.922
	2. Willingness to share recommended information	0.922
	3. Acceptance of risk by sharing information	0.922
	4. Trust not to recommend wrongly	0.922
Reputation	1. Knowledge on the product	0.921
	2. Experience on the product	0.921
	3. Providing useful information on the product	0.921
	4. Influential on the product	0.921
Sincerity	1. Consistent behavior	0.789
	2. Active behavior	0.789
	3. Diligence	0.789
	4. Faithfulness	0.789
Closeness	1. Long time communication	0.920
	2. Close friendship	0.920
	3. Easiness to talk	0.920
	4. Response on conversation	0.920
Similarity	1. Similar tastes on the product	0.921
	2. Like together on the product	0.921
	3. Like to have similar product	0.921
	4. Need to have same product	0.921

Table 4: Results of factor analysis				

Rotated components matrix

	Component				
	1	**2**	**3**	**4**	**5**
Reputation1	0.122	0.758	0.414	0.225	0.143
Reputation2	0.097	0.864	0.303	0.166	0.105
Reputation3	0.165	0.708	0.477	0.227	0.159
Reputation4	0.047	0.842	0.051	0.217	0.159
Sinserity1	0.056	0.155	0.334	0.043	0.630
Sinserity2	0.412	−0.010	0.208	0.056	0.546
Sinserity3	0.045	0.137	0.113	0.248	0.831
Sinserity4	0.154	0.194	0.103	0.162	0.856
Closeness1	0.864	0.091	0.155	0.056	0.244
Closeness2	0.835	0.151	0.081	0.136	0.072
Closeness3	0.888	0.080	0.138	0.246	0.015
Closeness4	0.862	0.048	0.157	0.191	0.113
Similarity1	0.196	0.237	0.184	0.860	0.124
Similarity2	0.188	0.191	0.254	0.829	0.193
Similarity3	0.207	0.203	0.217	0.843	0.160
Similarity4	0.201	0.373	0.444	0.569	0.167
Trust1	0.179	0.419	0.701	0.330	0.237
Trust2	0.219	0.318	0.735	0.312	0.243
Trust3	0.224	0.172	0.759	0.223	0.222
Trust4	0.141	0.424	0.681	0.227	0.244

Moderation effect can be tested by the significance of interaction term statistically. Generally speaking, independent variable and moderation variable should be significant to test moderation effect. However, significance of independent and moderation

Table 5: Regression result: Effect of antecedents on recommendation trust

Dependent variable	Independent variable	R square	F	p value	B	Standard B	t value	Sig	VIF
Recommendation trust	(constant)	0.689	110.722	0.000	−0.161		−0.803	0.423	
	Reputation				0.424	0.445	8.776	0.000***	1.656
	Sincerity				0.264	0.215	4.586	0.000***	1.410
	Closeness				0.095	0.094	2.066	0.040**	1.327
	Similarity				0.305	0.281	5.177	0.000***	1.889

Table 6: Hierarchical regression result: Moderation effect of product involvement

Independent variable	Main effect						Interaction effect					
	Restricted model			Add moderation			Add interaction 1			Add interaction 2		
	Std. B	Sig	VIF	Std. B	Sig	VIF	Std. B	Sig	VIF	Std. B	Sig	VIF
(Constant)		0.423			0.677			0.720			0.613	
Reputation	0.445	0.000	1.656	0.451	0.000	1.666	0.402	0.000	1.818	0.452	0.000	1.666
Sincerity	0.215	0.000	1.410	0.217	0.000	1.411	0.232	0.000	1.425	0.227	0.000	1.429
Closeness	0.094	0.040	1.327	0.088	0.054	1.337	0.103	0.022	1.352	0.092	0.044	1.340
Similarity	0.281	0.000	1.889	0.276	0.000	1.897	0.272	0.000	1.897	0.260	0.000	1.937
Involvement				−0.057	0.149	1.018	−0.055	0.160	1.018	−0.058	0.144	1.018
Rep X Inv							0.133	0.001	1.130			
Clo X Inv										−0.081	0.043	1.030
R square	0.689			0.692			0.708			0.698		
Sig. (model)	0.000			0.000			0.000			0.000		

variables are not a necessary condition to test moderation effect according to the Baron and Kenny [1986]. It can be interpreted that moderation effect exists if the coefficients of interaction term (Rep X Inv, Clo X Inv)are significant even though there is no significant main effect by independent or moderating variables. It can be seen from Table 6 that the main effects of independent variables are statistically significant. However, while the coefficient of product involvement is not significant, the coefficients of interaction terms are significant (p=0.01 for Rep X Inv, and p=0.043 for Clo X Inv), under the significance level of 0.05. This strongly supports there is moderating effect of product involvement between reputation, closeness and recommendation trust. Therefore our hypotheses H2 and H6 are supported.

Figure 2 shows the interaction intensity of reputation and closeness for both movie and computer. In Figure 2, the y axis represents recommendation trust and x axis represents reputation and closeness respectively. The slope of the plotted equations depict that there is an interaction because the magnitude of the difference between the movie and computer is different at different levels of the reputation and closeness. When the value of reputation is high, reputation has slightly higher affection on trust in case of recommending high involvement product (computer)than low involvement product (movie) (0.755 > 0.605). On the other hand, recommendation trust is more strongly influenced by closeness in case of recommending low involvement product than high involvement product when the closeness is high (0.564 > 0.337). To summarize, it is desirable to receive recommendation on low involvement product than high involvement product from a close friend. On the contrary, it is desirable to receive recommendation on high involvement product than low involvement product from an expert.

5. CONCLUSION

This study aimed to investigate significant antecedents and moderation effect of product involvement on recommendation trust based on the belief that the perceived trust of recommendee toward recommender depends on some social relationships and characteristics of recommenders. For this purpose, we extracted four social information including closeness, similarity, sincerity and reputation and identified that recommendation trust is significantly influenced by those social information. The most important antecedent for recommendation trust is reputation. This means reputation affect more strongly to the recipient's perceived trustworthiness on recommendation than any other antecedents. We also identified the moderation effect of product involvement on recommendation trust. It is found that the effect of perceived closeness toward recommender on
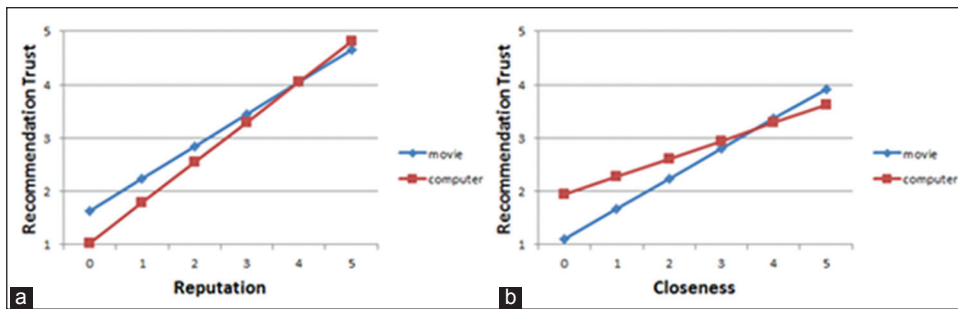
Figure 2: Interaction effect comparison, a) interaction effect of involvement between reputation and trust (movie: Y= 1.639+0.605X, computer: Y=1.030+0.755X), (b) interaction effect of involvement between closeness and trust (movie: Y= 1.103+0.564X, computer: Y=1.936+0.337X)

recommendation trust is stronger in case of recommending low involvement product than high involvement product. On the contrary, the effect of perceived reputation toward recommender on recommendation trust is stronger in case of recommending high involvement product than low involvement product.

The result of this study has practical implication because the higher the recommendation trusts, the higher the possibility to produce more accurate recommendation. The most significant contribution of this study is the integration of product involvement level with the antecedents. The online retailers could use the social information differently on different types of products when they will develop their recommendation system. This will also greatly improve quality of recommendation system. However, the result of this study should be interpreted only in case of Korean youth because all the respondents are Korean university students. This study chose movie for an example of low involvement category and computer for an example of high involvement product category to test the moderation effect of product involvement. Therefore additional experiment is needed for extending to another products within those categories to test the moderation effect of product involvement because e-commerce sites offer lots of products. It will be also interesting if we test the proposed hypothesis for more specific real online e-commerce site or social network. While our study shows only behavioral aspects, we hope to leverage this preliminary study to further investigate the ways to enhance the social recommendation system specially by considering proposed social information with the product types.

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