Association for Information Systems
AIS Electronic Library (AISeL)

ECIS 2011 Proceedings

European Conference on Information Systems (ECIS)

Summer 10-6-2011

EXPLORING INTENTION TO REUSE RECOMMENDATION AGENTS FROM ACCESSIBILITY-DIAGNOSTICITY PERSPECTIVE: THE MODERATING EFFECT OF DOMAIN KNOWLEDGE

Li-Ting Huang

Wu-Shien Kao

EXPLORING INTENTION TO REUSE RECOMMENDATION AGENTS FROM ACCESSIBILITY-DIAGNOSTICITY PERSPECTIVE: THE MODERATING EFFECT OF DOMAIN KNOWLEDGE

Huang, Li-Ting, Department of Information Management, Chang Gung University, No. 259 Wen-Hwa 1st Road, KweiShan TaoYuan, 333, Taiwan, lthuang@mail.cgu.edu.tw

Kao, Wu-Shien, Department of Business Administration, National Central University, No. 300, Jhongda Rd., Jhongli City, Taoyuan County 320, Taiwan, andycow0@gmail.com

Abstract

*Recommendation agents help users reduce information overload and improve decision quality. Yet, many online shoppers have negative reaction or have no motivation to use recommendation agents, since they have no idea of whether users can achieve their shopping goals with less effort. We think information is fundamental to using recommendation agents. This study develops a research framework from the accessibility-diagnosticity perspective and proposes explanation facility, perceived similarity and information diagnosticity are important determinants of users' intention to reuse RAs. We think explanation facility could persuade users of RAs' performance, similarity could move users to agree with RAs, and information diagnosticity could let users be capable of evaluating RAs. We also consider the moderating role of domain knowledge on relationship of similarity and information diagnosticity. This study conducted a 2*2 factorial experiment for data collection. Results show that decision process and outcome similarity indirectly influence reuse intention by information diagnosticity and the effects of process and outcome similarity varies with degrees of users' domain knowledge. The influence of explanation facility on similarity is not obvious. The effect of "why" explanation facility on outcome explanation is significantly contrary to our expectation. Explanation facility may have to be utilized carefully. Implications are discussed.*

Keywords: Recommendation Agents, Explanation Facility, Similarity, Information Diagnosticity, Intention to Reuse.

1 Introduction

Online users usually face a problem of information overload and may be incapable of evaluating products and choosing an appropriate product (Kim and Yoo, 2000). Online recommendation agents (RAs) are becoming popular tools at websites, which provide shopping assistance to users, help users to reduce information overload, as well as improve users' decision quality based on users' preference, shopping history, or other consumers' choices (Wang and Benbasat, 2005). Recommendation technologies are widely utilized by various e-tailers, such as www.ActiveBuyersGuide.com, Amazon.com, Yahoo.com, Sony.com, Books.com.tw, etc. An emerging research stream focuses on interaction between recommendation agents and users, view recommendation agents as social actors. Empirical studies stress on the importance of users' positive feeling of recommendation agents and determinants of users' feeling during interaction processes, such as perceived usefulness, satisfaction and trust (e.g., Su et al., 2008; Wang and Benbasat, 2005, 2007; Xiao and Benbasat, 2007), familiarity (Komiak and Benbasat, 2006), similarity (Al-Natour et al., 2005, 2006, 2008) and explanation facility (e.g., Wang and Benbasat, 2007). Contingent effect on why users adopt RAs were explored, such as types of recommendation agents (Su et al, 2008), shopping goals, and domain knowledge (Al-Natour et al., 2008).

Studies of this research stream treat trust as direct determinants of adopting RAs and then focus on influences of similarity, familiarity and explanation facility on trust. However, we think that evaluation of RAs' capability and performance is critical to reuse RAs, in additional to trust and satisfaction. If suggestions proposed by a RA could move users and hit users' implicit needs, users are willing to rely on the RA and reuse it. Al-Natour et al. (2008) proposed that similarity is the determinant of evaluation. But factors which influence users' perceived similarity are still uncultivated. We think that proper design of information presentation could increase users' ability of processing information, users' understanding of reasoning process and provided advices. When users perceive that behavior and personality of recommendation agents are similar to themselves, they will be more in agreement with the recommendations provided for them. Then, users will intent to reuse the recommendation agents. In addition, the moderating roles of personal characteristics also arouse our research interest. The moderating effect of domain knowledge on the relationship of explanation facility and trust is supported, but on the relationship of information presentation and evaluation of recommendation agents is still worth being examined. Users who know much information about a specific product will be possibly capable of evaluating RAs' performance by their own knowledge, while users with less understanding about features of a specific product will tend to evaluate RAs by extrinsic cues. Accordingly, we attempt to answer three research questions in this study.

- Do users' evaluations of RAs affect their intention to reuse recommendation agents? What factors will influence users' evaluation of RAs?
- What kinds of information presentation will increase users' agreement with what recommendation agents propose?
- Does the relationship of users' agreement with and users' evaluation of RAs will vary with different level of domain knowledge? If yes, what are comparative influences of different level of domain knowledge on the relationship?

2 Conceptual Background and Hypotheses

2.1 Accessibility – Diagnosticity Model

From the perspective of accessibility-diagnosticity, any piece of information is influential and important to users' decision depends on the users' diagnosticity and accessibility of the information (Feldman and Lynch, 1988). Herr et al. (1991) pointed out that accessibility and diagnosticity of

product information influence the importance and weight of product information. The more accessibility of information presentation for specific objectives is increased, the higher possibility the information is used for judging the objectives. Consumers usually have to collect product information to build product knowledge and attitude before they make decision about product purchase. However, consumers are usually limited to process amount of product information because of bounded cognitive processing ability (Wang et al., 2007). Therefore, how users access product information will affect attitude and evaluation of products. Before adopting RAs' recommendations, users will evaluate the perceived ability of RAs and decide whether the suggestions satisfy their need. Hence, information presented on RAs must be easily accessed and understood by users. Then users could possibly have positive attitude after evaluating RAs and then are willing to rely on RAs.

2.1.1 Explanation Facility

RAs possess much information related to target behavior, but users are incapable of verifying the competence of the RAs (Wang and Benbasat, 2007). In addition to information asymmetry, users also wonder whether RAs could honestly help them to select suitable products. So users may worry about whether RAs are capable of giving users proper advice and whether RAs care about users' interests and benefits (Bhattacherjee, 1998). Based on the perspective of accessibility-diagnosticity, accessibility is defined that the manner of product information presentation, which has to be interesting, easy to be retrieved, easy to be noticed, and easy to be embedded into consumers' memory (Wang et al., 2007). Wang et al. (2007) proposed that the manner of product presentation has been identified as a significant factor affecting information accessibility.

Explanation facilities are considered as an important feature of RAs, since they could represent RAs' accessibility. Explanation facilities can make the whole mechanism of RAs more transparent to users by revealing detail explanation related to why RAs ask certain questions and how they process information to reach their conclusions (Gregor and Benbasat, 1999). Studies stated that employing explanation facilities in RAs increase users' acceptance (Herlocker et al., 2000), and improve users' trust in RAs (Al-Natour et al., 2008; Wang and Benbasat, 2007). Wang and Benbasat (2007) proposed a framework of explanation facilities including "how" and "why." "How" explanation demonstrates "lines of reasoning" used by RAs (Wang and Benbasat, 2007). It presents the whole logic decision-making processes involved in reaching final recommendations based on users' inputs about needs and preferences and informs users about the "procedures" regard to how agents generate recommendations. "Why" explanation demonstrates the importance and purpose of certain questions to consumers asked by RAs, as well as the justification of proposed recommendations. "Why" explanation could reveal that a RA is devoted to find product what users want and signal to users that this RA is exactly what users are seeking for. So, users are able to evaluate RAs based on cues providing by explanation facilities. Accordingly, we think that users will increase their understanding of recommendation agents and then be able to compare the difference of RAs and themselves. If recommendation agents are be well designed to propose appropriate product alternatives based on users' input, users may perceive great personalization, similarity and concerns from RAs, and then satisfy the whole interactive process and final suggestions.

2.1.2 Similarity

Users are usually attracted by other when they think others are similar to them (Al-Natour et al., 2008). Byrne et al. (1967) showed that perceived similarity is one of the most important antecedents of evaluating other partners when individual interacts with others. The relationship has also shown in the context of human-technological artifact interaction (Al-Natour et al., 2006). In the context of decision making, empirical studies reveal that decision makers prefer information that is little confirmation bias from their own alternatives (Al-Natour et al., 2008). Al-Natour et al.'s (2005) study showed that perceived similarity influences a number of evaluative responses and positively affects users' intent to reuse the assistant of decision-making. Al-Natour et al.'s (2008) further investigated similarity and

showed that perceived similarity enhances users' feelings of trust in the assistant of decision-making and users' perceptions of its usefulness. Accordingly, we proposed that similarity is an important mediator between the relationship of accessibility and diagnosticity. From accessibility-diagnosticity model, information accessibility positively associates with information diagnosticity (Feldman and Lynch, 1988). Perceived similarity information influences users' evaluation response and increases users' perceived usefulness (Al-Natour et al., 2005). When users could easily retrieve information, put information on memory and then easily remind it, they will be able to compare differences between presented information and their desires and then are likely to evaluate RAs. Al-Natour et al. (2008) proposed that perceived similarity consists of decision process similarity and decision outcome similarity. Perceived decision process similarity is defined as users' perception of the similarity between their reasoning and decision process and those of the decision aids (Al-Natour et al., 2008). Perceived decision outcome similarity is defined as users' perception of the similarity between their decision outcomes and those of the decision aids (Al-Natour et al., 2008). Hence, we propose:

H1: Users will perceive higher decision process similarity in the RAs with "how" explanations.

H2: Users will perceive higher decision outcome similarity in the RAs with "why" explanations.

Moreover, Al-Natour et al. (2008) proposed the positive effect of perceived decision outcome similarity on decision process similarity. Byrne et al. (1967) stated that individuals will likely use information regarding similarity on one dimension in their evaluations of similarity in considering a different, yet a related dimension. That is, individuals usually use less-specific characteristics in their evaluation of the specific characteristics. The results of Al-Natour et al.'s (2008) study revealed that perceptions of outcome similarity affect users' perceptions of decision process similarity. Hence, we propose:

H3: Users' perceived decision outcome similarity will positively affect their perceived decision process similarity.

2.1.3 Information Diagnosticity

From the perspective of accessibility-diagnosticity model, information diagnosticity effect occurs when the consumer feels that the presented product information allows for a better assessment of the product and uses the information as an input to form product attitude. Information diagnosticity refers to users' perceived ability of relevant product information presented on the website or decision aids to understand and evaluate the quality and performance of proposed products (Jiang and Benbasat, 2005). Jiang and Benbasat (2005) had used the construct perceived diagnosticity to represent consumers' perceptions of the ability of a website to convey relevant product information. In the context of product decision-making, consumers tend to have a cognitive structure arising from her consumptive needs before considering and searching products and relevant information. If users think product information is related to their needs, they will be capable of evaluating the product as to whether it satisfies their needs (Wang et al., 2007). If users perceive that the presented information by a RA is similar to their decision process and outcome, they will think the RA is useful for their decision (Al-Natour et al., 2008). We think information diagnosticity is the former step of perceived usefulness. Users must have adequate capability to evaluate RAs first and then increase users' perceived trust and usefulness of decision aids. Hence, we propose:

H4: Users' perceived decision process similarity will positively affect their perception of information diagnosticity.

H5: Users' perceived decision outcome similarity will positively affect their perception of information diagnosticity.

Empirical studies support the positive relationship of information diagnosticity and consumers' decision-making. For example, Jiang and Benbasat (2005) and Suh and Lee (2005) revealed the effect of diagnosticity of consumer-product interactions on product learning and consumption decision.

McKinney et al. (2002) showed that information diagnosticity improves the understandability of information would enhance users' satisfaction with the usage of that system. Jiang and Benbasat (2007) demonstrated the influence of information diagnosticity on attitude toward products, and in turn on users' intention to return. Wang et al. (2007) proposed a framework based on the accessibility-diagnosticity model and supported the influence of information diagnosticity on recommendations acceptance. Hence, we propose:

H6: Users' perceived information diagnosticity will positively affect their intention to reuse the RAs.

2.2 The Influence of Domain Knowledge

Users' domain knowledge refers to the level of understanding and involvement about attributes of products that users plan to buy. Users with high domain knowledge are usually defined as experts, whereas those who with low domain knowledge are usually defined as novices. Su et al. (2008) described that experts understand how particular attributes contribute to the effectiveness of the total product very well because of their greater knowledge about products, whereas novices are likely to evaluate the product on the basis of more observable features because of lack sophisticated knowledge about products. Domain knowledge is critical to understand behaviors related to information search, information processing, and decision-making (e.g., Al-Natour et al., 2008; Su et al., 2008). Su et al. (2008) demonstrated that consumers' domain knowledge influences the consumers' perceived costs of information search, satisfaction and effectiveness for recommendation agents. Al-Natour et al. (2008) proposed that users' domain knowledge moderates the relationship between decision similarity and trust of decision aids. Novices lack sufficient knowledge to accurately interpret and understand the output of the decision aids, so they are more likely rely on explanation about problem-solving strategies and outcome provided by decision aids (Dhaliwal and Benbasat, 1996). Therefore, novices are likely easy to utilize explanation of decision aids because of decision process similarity and then perceives high usefulness and are willing to rely on decision aids, whereas experts are expected to be able to comprehend the reasoning process of decision aids, even if decision aids uses a different process (Al-Natour et al, 2008). Hence, we propose:

H7: The influence of perceived decision process similarity on information diagnosticity in the RAs will be stronger when users are novices (the degree of knowledge domain is low).

H8: The influence of perceived decision outcome similarity on information diagnosticity in the RAs will be stronger when users are novices (the degree of knowledge domain is low).

The research framework is shown in Figure 1.

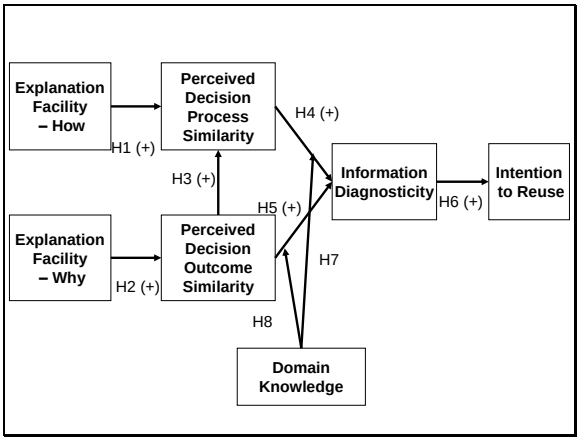

Figure 1. Research Framework

3 Research Method

3.1 Operationalization and Instrument Design

The instruments for constructs were adapted from literature and revised to fit our research context, as shown in Table 1. All items were anchored on five-point Likert scales, from strong disagreement to strong agreement. A short interview with several colleagues and experts and a pre-test were carried out to ensure face validity and content validity for the questionnaires. Explanation facility includes "why" and "how." Explanation facility was the experimental treatment with two levels: with and without description which stick by the definition of "why" and "how." Measurement items of domain knowledge were developed based on professional periodicals and discussion which are related to the experimental target product.

Construct	Definition
Explanation – Why	It reveals the importance and purposes of a RA's questions for final recommendations to users (Wang and Benbasat, 2007).
Explanation – How	It reveals the line of reasoning to final recommendations of a RA's questions based on users' needs and attribute preferences (Wang and Benbasat, 2007)
Domain knowledge	The degree of users' product knowledge and ability to perform product-related tasks successfully (Su et al., 2008).
Process similarity	The extent to which users perceive the similarity between their reasoning and decision process and that of RAs (Al-Natour et al., 2008).
Output similarity	The extent to which users perceive the similarity between their reasoning and decision outcome and that of RAs (Al-Natour et al., 2008).
Information diagnosticity	The extent to how well the recommendations from RAs convey product features from users' needs (Wang et al., 2007).
Intention to reuse	The extent to which users are willing to adopt RAs to get shopping advices after an initial use (Al-Natour et al., 2008; Wang and Benbasat, 2005)

Table 1. Operationalization for Constructs

3.2 Experiment Design and Data Collection

To examine effects of explanation facility on decision similarity and the moderating effect of domain knowledge, a 2×2 factorial experimental design was employed. An artificial recommendation agent is designed to make recommendations for digital cameras based on the participants' preferences and requirements in this experiment. As Wang and Benbasat's (2007) suggestions, digital cameras were chosen because RAs for digital cameras have been developed in commercial and digital cameras are popular and welcomed by undergraduate and graduate students. Besides, digital cameras are with complex features, short life cycle and many types and brands in the market. We picked out 167 types of digital cameras which are belonged to 11 brands, such as Sony, Nikon, Olympus, Samsung, Cannon, Panasonic and so on. Descriptions for explanation provision, including "why" and "how" were appeared below a specified feature. For example, description related to why "optical zoom" is important to users and how "optical zoom" related to final recommended digital camera was put on below the line of "optical zoom," which is a selection criterion in the web page. Domain knowledge is measured by 15 true-false items that are developed by information from *"PCDIY Digital Camera Purchase, Photograph and Utilization"* and discussion with several individuals who had extensive knowledge of digital camera so as to evaluate degree of participants' understanding about digital camera. Participants were classified by their scores of measurement of domain knowledge. Measurement items of domain knowledge were asked before participants operated the recommendation agent. The manipulated factors are why (with/without) and how (with/without).

We carried out a pre-test to make sure the meaning and wording of measured items for our targeted context. We carried out a pilot test to insure the appropriateness of experimental procedures, such as the manipulation of explanation facility and layout of web pages. The experiment was conducted in three steps. First, a short questionnaire of domain knowledge was filled in by participants as to discriminate experts and novices about digital cameras. And then, participants were randomly assigned to one of four scenarios for finishing experimental tasks. Second, participants were given an assignment to utilize the recommendation agent to pick out one camera for their good friends. Participants freely chose criteria for product selection based on their preference and requirements and then browse specification of the chosen digital camera. They could repeatedly operate the recommendation agents until they find out a qualified digital camera. Finally, they fill in a self-administrated web-based questionnaire designed to measure their perceptions on decision process similarity, decision outcome similarity, information diagnosticity and behavioural intention. The whole procedures spend participants 20~30 minutes.

We posted messages to solicit for participation on BBS of Chang Gung University during one week. The message comprised objectives of this study, URL address, and incentive of a drawing for small prizes, which could attract more users to join this survey. Participants were self-selected for this study via the posted messages, but must have experience of using and buying digital cameras. During this period, 240 participants were recruited for this experiment. After scrutinizing data, 203 questionnaires were used for data analysis.

4 Data Analysis and Results

4.1 Measurement Model

The measurement model was assessed by confirmatory factor analysis using AMOS 7.0. Factors loadings of indicators are all above the acceptable level of 0.5 and significant ($p<=0.01$). It reveals the acceptance of construct validity. The fit indices of measurement model are acceptable and reveal that these models fit well with the observed data. The reliability and convergent validity are acceptable as compared the threshold suggested by Bagozzi (1980): 0.7 and 0.5 respectively, as shown in Table 2. The discriminant validity is acceptable based on the rule that the correlations between any two distinct construct are lower than the square root of the average variance extracted of these constructs (Fornell and Larcker, 1981), as shown in Table 3.

Construct	Mean	S.D	Composite Reliability	Average Variance Extracted
Process similarity	3.27	0.81	0.95	0.87
Output similarity	3.35	0.86	0.95	0.87
Information Diagnosticity	3.91	0.81	0.91	0.74
Intention to reuse	3.40	0.86	0.99	0.94

Table 2. Reliability and Convergent Validity

	Process similarity	Output similarity	Information Diagnosticity	Intention to reuse
Process similarity	**0.93**	–	–	–
Output similarity	0.59	**0.93**	–	–
Information Diagnosticity	0.49	0.57	**0.86**	–
Intention to reuse	0.59	0.66	0.58	**0.97**

Table 3. Discriminant Validity (Diagonal represents square root of AVE of each construct)

4.2 Hypotheses Testing

The structure model is analysed using AMOS 7.0. Two steps were performed for testing hypotheses. First, the main effect is examined (H1~H6). Second, the moderating effect (H7~H8) was examined by multi-group structural equation modelling analysis. Samples were classified by scores of domain knowledge.

The results of main effect are presented in Figure 2. The fit statistics of main effect are acceptable compared to the desired level, except for RMSEA, as presented in Table 4. But the value of RMSEA is slightly above the desired level. It reveals that this model fit well with the observed data. The association of "how explanation facility" and "perceived decision process similarity" is insignificant (H1). The relationship between "why explanation facility" and "perceived decision outcome similarity" is significant, but the direction is contrary to our prediction (H2). Others are all significant (H3~H6). The explained variance of intention to reuse RAs, information diagnosticity, perceived decision process similarity, and perceived decision outcome similarity are 34%, 38%, 32% and 6% respectively. The explained variance of perceived decision outcome similarity is low. The results reveal that information diagnosticity is important to intention to reuse RAs. Both perceived decision outcome similarity and perceived decision process similarity are major antecedents of information diagnosticity. Moreover decision outcome similarity also indirectly affects information diagnosticity mediated by decision process similarity. When users think that decision process and outcome suggested by RAs are similar to their logic and preference, they will believe that RAs are capable of proposing qualified suggestions in decision-making. Accordingly, users are more willing to reuse the RA under good experiences. Yet, the effects of explanation facilities are less than our expectation. Users usually think that products proposed by RAs, which explain why questions are important to products selection, are different from their preference or choices. RAs, which present the logic processes based on users' inputs, are unrelated to users' perception of decision process similarity. Furthermore, the influence of "why explanation facility" on decision outcome process is small.

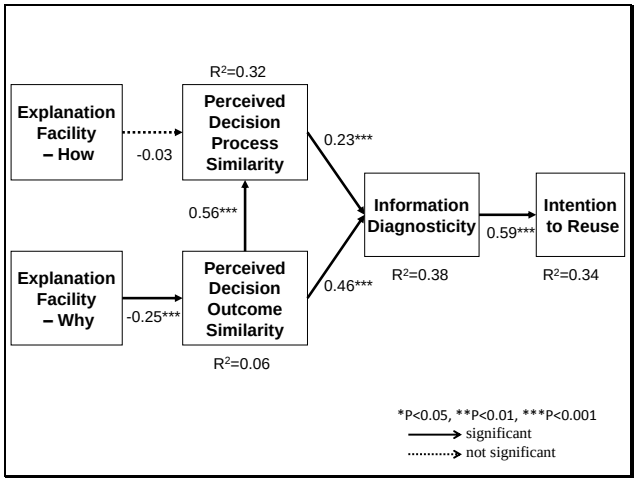

Figure 2. Structural Model -- Main Effects

	$\chi 2$	d.f.	$\chi 2$ / d.f.	Standardized RMR	RMSEA	NFI	CFI	GFI
Model	218.656	84	2.60	0.07	0.089	0.90	0.93	0.87
Desired levels	Not significant	--	< 3.0	.05 ~ .08	.05 ~ .08	> .90	> .90	> .80

Table 4. Model Fit Indices for Structural Model – Main Effect

As for testing moderating effect of domain knowledge (H7 and H8), two steps were carried out. We split sample into three groups based on the distribution of scores in the construct of domain knowledge.

In order to differentiate between experts and novices, we picked out one third with high scores as the group of "expert" and one third with low scores as the group of "novice." The scores in the "expert" group are greater than and equal 7 and the number of sample is 94. The scores in the "novice" group are less than and equal 5 and the number of sample is 85. Because of the ratio of indicators to sample is less than 1:5. We performed path analysis by AMOS 7.0 to examine the difference in associations of decision process similarity and information diagnosticity as well as decision outcome similarity and information diagnosticity between two groups. The result is shown in Figure 3. The top diagram of Figure 3 shows results of the "expert" group and the bottom diagram shows results of the "novice" group. Compared with the "expert" group, the influence of perceived decision process similarity on information diagnosticity is stronger in the "novice" group, since the association is insignificant in the "expert" group and significant in the "novice" group. But, the influences of perceived decision outcome similarity on information diagnosticity in both groups are alike. Accordingly, H7 is supported and H8 is not supported. Users in the "novice" group utilize both process and outcome similarity to judge quality of recommendations by RAs and users in the "expert" group only utilize outcome similarity to appraise RAs' performance. Besides, the explained variance of intention to reuse, information diagnosticity and perceived process similarity in the "novice" group are greater than in the "expert" group. It seems that users in the "novice" groups relies on decision process similarity and outcome similarity to evaluate ability of RAs and in turn to affect their intention to reuse RAs much more than users in the "expert" group. Users' intentions to reuse RAs in the "novice" group tend to be influenced by their evaluation of RAs' capability much more than in the "expert" group. Although the explained variance of perceived decision process in the "expert" group is greater than in the "novice" group, the indirect effect of decision outcome similarity on information diagnosticity mediated by decision process similarity is absent because of insignificant association.

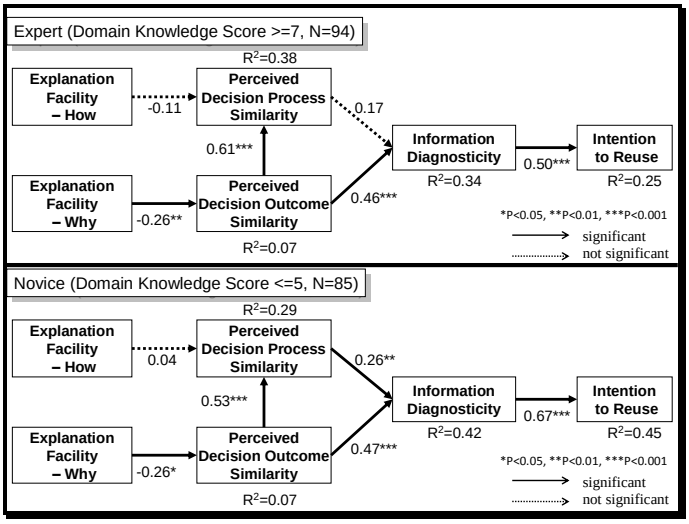

Figure 3. Structural Model -- Moderating Effects

5 Discussion and Implications

5.1 Conclusions and Future Research

This study applies the accessibility-diagnosticity perspective, as well as considers the mediating role of similarity and the moderating role of domain knowledge to explore users' intention to reuse RAs. Out of eight hypotheses, five hypotheses are statistically supported. The association of "how" explanation facility and decision process similarity is unsupported and the moderating effect of domain knowledge on relationship of decision outcome similarity and information diagnosticity is also

unsupported. The association of "why" explanation facility and decision outcome similarity is opposite to our expectation.

Four main findings are drawn from results. First, process similarity and outcome similarity are critical to evaluate RAs. When users perceive that RAs is similar to their own decision process and final decision, they will tend to think RAs is good at recommend product purchase and then are willing to reuse RAs. Especially, decision outcome similarity is more important than decision process similarity because direct and indirect effect of outcome similarity is much greater than process similarity. The total effect of decision outcome similarity on information diagnosticity is 0.59 (0.46+0.56*0.23). The total effect of decision process similarity on information diagnosticity is 0.23. The results extend the Al-Natour et al.'s (2008) findings. This study shows both effects of process and outcome similarity on information diagnosticity and the comparative importance between process and outcome similarity. Second, explanation facility indirectly influences information diagnosticity by similarity, although the association of "how" explanation facility and process similarity is unsupported. The insignificant effect of "how" explanation facility on decision process similarity shows users are not care for explanation about procedures of generating recommendations. Users maybe think that operating procedure is sufficient to explain RAs' decision process and the "how" explanation facility is unnecessary. The reverse association of "why" explanation facility and decision outcome similarity shows that users treat explanation of the importance and purposes of RAs' questions and the justification of proposed recommendations as negative signals. It seems that explanation confounds users' attention and perception on RAs. It is possible that "why" explanation activate users' attention on product knowledge and then could clearly recognize the slight differences between them and RAs. However, the small predictive power of "why" explanation on decision outcome similarity indicates there should be other antecedents of similarity. Third, the influence of information diagnosticity on users' reuse intention is approved. If users are capable of evaluating RAs' competence and performance, they are willing to reuse RAs. It shows that information diagnosticity not only indirectly affect reuse intention by attitude towards RAs (Jiang and Benbasat, 2005), but also directly affect reuse intention. It is also consistent with Wang et al.'s (2007) study, which showed information diagnosticity increases users' acceptance of recommendations. Users accept recommendations proposed by a RA and then they are probably to reuse it. Finally, the moderating role of domain knowledge is partially supported. Novices rely on decision process similarity to evaluate RAs' performance much than experts. It is possible that novices need cues collected from interaction process to help them on evaluating RAs. However, the influence of decision outcome similarity on information diagnosticity is almost identical between expert and novices. It presents that the agreement on the final output of a recommendation is the most important factor for users to recognize RAs' competence. This result is similar to Al-Natour et al.'s (2008) findings, which showed the moderating effect of domain knowledge on the association of process similarity and perceived usefulness. In addition, the explained variance of reuse intention in the novice group is much greater than in the expert group (0.45: 0.25). It reveals that there may be other antecedents of experts' reuse intention, in additional to information diagnosticity.

According to these findings, there are three academic implications. First, this study extends the accessibility-diagnosticity perspective in the field of RAs. This study stresses on the important role of decision process and outcome similarity in the linkage of accessibility and diagnosticity. Second, yet, the little influence of explanation facility is less than our expectation and indicates that explanation facility is insufficient to determine users' perceived similarity. It is deserved to further research to find out more antecedents of similarity. Third, the importance of information diagnosticity on reuse intention is existent. But the predict power of information diagnosticity on reuse intention for experts is less than novices. It shows that experts consider more factors when they decide to reuse a RA. Figuring out experts' considering factors of reuse intention is worth further exploring.

5.2 Managerial Implications

Our findings lead to three suggestions for managers of conducting recommendation agents, who want to improve users' revisiting. First, managers could treat similarity as critical factors for indirectly raising users' reuse intention. Decision outcome similarity is more important than decision process similarity. Managers could try to increase users' agreement on RAs' decision-making procedures and RAs' recommendations during interaction process. If users could perceive what RAs' think and their own minds is exactly the same, they will be the side of RAs and then are willing to revisit RAs. Especially, users will be moved by RAs' final recommendations. If users appreciate RAs' recommendations, they will rate high points for RAs. Accordingly, managers could try to design RAs for meet users' preferences and requirements well. However, novices still rely on decision process similarity. Hence, managers could differentiate users' domain knowledge and give them what procedures they pay more attention. Second, because of the importance of similarity, it is crucial to figure out determinants of similarity. We proposed explanation facility as antecedents of similarity based on accessibility-diagnosticity model, yet the effects of explanation facility are unclear. The association of "how" explanation facility and process similarity is not obvious. Manager could pay more attention on the sequences of asked questions, rather than particularly utilize "how" explanation facility. Managers should be careful of applying "why" explanation facility, since of negative association of "why" explanation facility and outcome similarity. The description regards as reasons why the RAs ask certain questions or perform certain actions must be clearly transmit signals that this RA is exactly what users are seeking for, otherwise users may misunderstand this RA. Third, the importance of information diagnosticity on reuse intention varies with degree of users' domain knowledge. Novices rely more on outcome of evaluating RAs than experts when they decide on whether reuse this RA. Managers could utilize this feature to give distinct treatment by levels of users' domain knowledge.

5.3 Limitations

Due to limitations of this study, results should be treated with caution. First, data was collected by experiment. The targeted product was digital camera and participants were undergraduate and graduate students, so the generalizability of findings may be limited. Second, the doubts of self-selection may lead to a bias, since participants were volunteers and attracted by monetary incentives. But we tried to eliminate this bias by randomly assigning participants to four experimental settings. Third, participants may lack for abundant experience in using RAs, since RAs is not comprehensive applied to online purchase in Taiwan. Yet, we tried to eliminate this bias by introducing characteristics of RAs before starting the formal experiment and by filtering participants through online purchase experience.

References

Al-Natour, S., Benbasat, I. and Cenfetelli, R. (2005). The role of similarity in e-commerce interactions: The case of online shopping assistants. In Proceedings of the Fourth Annual Workshop on HCI Research in MIS, pp. 70-74, Las Vegas, Nevada.

Al-Natour, S., Benbasat, I. and Cenfetelli, R.T. (2006). The role of design characteristics in shaping perceptions of similarity: The case of online shopping assistants. Journal of the Association for Information Systems, 7 (12), 821-861.

Al-Natour, S., Benbasat, I. and Cenfetelli, R.T. (2008). The effects of process and outcome similarity on users' evaluations of decision aids. Decision Sciences, 39 (2), 175-211.

Bagozzi, R.P. (1980). Casual Models in Marketing. John Wiley and Sons, New York.

Bhattacherjee, A. (1998). Managerial influences on intraorganizational information technology use: A principal–agent model. Decision Sciences, 29 (1), 139–162.

Byrne, D., Griffitt, W. and Stefaniak, D. (1967). Attraction and similarity of personality characteristics. Journal of Personality and Social Psychology, 5, 82-90.
Dhaliwal, J.S. and Benbasat, I. (1996). The use and effects of knowledge-based system explanations: Theoretical foundations and a framework for empirical evaluation. Information Systems Research, 7, 342–362.
Feldman, J.M. and Lynch J. (1988). Self-generated validity and other effects of measurement on belief, attitude, intention, and behavior. Journal of Applied Psychology, 73(3), 421-435.
Fornell, C. and Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 36 (10), 1246-1255.
Gregor, S. and Benbasat, I. (1999). Explanations from intelligent systems: Theoretical foundations and implications for practice. MIS Quarterly, 23, 497–530.
Herlocker, J., Konstan, J.A. and Riedl, J. (2000). Explaining collaborative filtering recommendations. In Proceedings of the 2000 ACM Conference on Computer Supported Cooperative Work, pp. 241–250, Philadelphia.
Herr, P.M., Kardes, F.R. and Kim, J. (1991). Effects of word-of-mouth and product-attribute information on persuasion: An accessibility-diagnosticity perspective. Journal of Consumer Research, 17 (4), 454-462.
Jiang, Z. and Benbasat, I. (2005). Virtual product experience: Effects of visual and functional control of products on perceived diagnosticity and flow in electronic shopping. Journal of Management Information Systems, 21 (3), 111–148.
Jiang, Z. and Benbasat, I. (2007). Investigating the influence of the functional mechanisms of online product presentations. Information Systems Research, 18 (4), 454-470.
Kim, J. and Yoo, B. (2000). Toward the optimal link structure of the cyber shopping mall. International Journal of Human–Computer Studies, 52 (3), 531–551.
Komiak, S. and Benbasat, I. (2006). The effects of personalization and familiarity on trust and adoption of recommendation agents. MIS Quarterly, 30 (4), 941–960.
McKinney, V., Yoon, K. and Zahedi, F.M. (2002). The measurement of web-customer satisfaction: An expectation and disconfirmation approach. Information Research Journal, 13 (3), 296–315
Su, H.J., Comer, L.B. and Lee, S. (2008). The effect of expertise on consumers' satisfaction with the use of Interactive recommendation agents. Psychology & Marketing, 25 (9), 859-880.
Suh, K.S. and Lee, Y.E. (2005). The effects of virtual reality on consumer learning: An empirical investigation. MIS Quarterly, 29 (4), 673-697.
Wang, W. and Benbasat, I. (2005). Trust in and adoption of online recommendation agents. Journal of Association Information Systems, 6 (3), 72–101.
Wang, W. and Benbasat, I. (2007). Recommendation agents for electronic commerce: Effects of explanation facilities on trusting belief. Journal of Management Information Systems, 23 (4), 217-246.
Wang, X, Teo, H.H. and Wei, K.K. (2007). The acceptance of product recommendations from web-based word-of-mouth systems: Effects of information, informant, and system characteristics. In Proceedings of Twenty Eighth International Conference on Information Systems, Montreal.
Xiao, B. and Benbasat, I. (2007). E-commerce product recommendation agents: Use, characteristics, and impact. MIS Quarterly, 31 (1), 137-209.