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INVESTIGATING THE ROLE OF FLOW EXPERIENCES IN USERS' REUSE INTENTIONS TOWARD RECOMMENDATION AGENTS: THE MODERATOR OF PRODUCT KNOWLEDGE

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ABSTRACT

Online recommendation agents can help users decrease information overload and reduce search complexity and, in turn, help improve decision quality. Studies related to human-computer interactions have shown that flow experiences can increase users' reuse intentions. However, few studies address the issue of users' flow experiences during interactions with online recommendation agents. This study focuses on the interactive process between users and recommendation agents. It provides a research model based on flow theory, as well as an information adoption model. We considered the influence of users' perceptions of operating processes and information content on flow experiences and the effects of flow experiences on information usefulness and reuse intentions. We conducted a 2*2 factorial laboratory experiment and derived three principal findings. First, flow directly influenced reuse intentions and indirectly influenced reuse intentions mediated by information usefulness. Users with flow experiences provided positive valuations of suggestions provided by recommendation agents. They were also willing to reuse these suggestions. Second, process similarity directly and positively affected flow experiences. Third, provision of explanation facility and consumer reviews influenced users' flow experiences. Provision of consumer reviews positively influenced flow experiences. However, provision of explanation facility negatively influenced flow experiences. Several theoretical and managerial implications are proposed.

KEYWORDS

Flow, Process Similarity, Explanation Facility, Consumer Reviews, Intention to Reuse Recommendation Agents, Information Usefulness.

1. INTRODUCTION

Online users may suffer from information overload and struggle with search complexity related to product attributes, prices, brands, reputation, and experiences when they shop on the Internet. Unlike real world shopping experiences, online users are unable to consult with salespeople (Kim and Yoo, 2000). Therefore, users may struggle to evaluate products and make appropriate selections. With the assistance of properly designed recommendation agents, users might more easily choose appropriate products/services, particularly with respect to complex products (Grenci and Todd, 2002). One research stream considers recommendation agents as social actors and explores interactions that occur between recommendation agents and users. This research stream proposes that users can rationally evaluate the capabilities of recommendation agents based on virtual interaction processes similar to those used in the real world, as well as on consequences examined from a utilitarian view. When users believe they have derived benefits from their use of recommendation agents, they will repeatedly patronize those recommendation agents. However, we wondered whether playful interaction processes induced users' feelings of satisfaction, agreeableness, and trust toward recommendation agents and, ultimately, whether they increased users' intentions to repeatedly patronize those recommendation agents..

Flow experiences have been widely examined in the context of online activities, such as information searching, web surfing, online chatting, online game, etc. When users enter into flow experiences by conducting online activities, they become immersed in these activities, can fully control their actions, can centre on the focus of their awareness, lose their self-consciousness, experience a sense of time transformation, and, ultimately, integrate these experiences within cyberspace. Flow experiences may be associated with satisfaction, diagnosticity, usefulness, trust, positive purchasing attitudes and intentions. E-tailers could increase users' positive feelings, attitudes, and intentions towards the use of recommendation agents and shopping websites by guiding users into flow states. Knijnenburg et al. (2012) considered flow experience as an important user experience of using recommendation systems. A high balance of skills and challenges can induce users' flow experiences. Therefore, the design of a recommendation agent that could raise users' skills to fit in with challenge levels would be a worthwhile exercise. Moreover, users' skills are determined by their involvement and understanding of products or issues. Ahn and Park (2012) proposed that hat customers' product expertise moderates users' evaluation of agents and its antecedents. The level of dependence on recommendation agents' cues may be adapted by users' owned skills. Recommendation agents could provide information cues, social cues and relationship cues that might increase users' abilities to select appropriate products and decreasing degree of challenges. When users interact with recommendation agents during online shopping, they may become immersed in these processes and gain benefits from these interactions with recommendation agents. Finally, these interactions may increase the likelihood that users will reuse recommendation agents. Accordingly, we attempt to answer four research questions in this study.

Therefore, we will attempt to answer four research questions in this study.

1. *Do users' flow experiences during their use of recommendation agents increase their intentions to reuse recommendation agents?*
2. *Do users' flow experiences during their use of recommendation agents directly affect their intentions to reuse or indirectly affect their intentions to reuse as mediated by perceived information usefulness?*

3. *Will improvements in users' skills in the use and understanding of recommendation agents induce flow experiences that will increase their reuse of recommendation agents? What factors might increase users' skills in the use and reuse of recommendation agents?*
4. *Does users' product knowledge influence their perception of recommendation agents' assistance in providing informational cues?*

Recommendation agents are classified into three types: content-filtering, collaborative-filtering, and hybrid (Xiao and Benbasat, 2007). Content-filtering recommendation agents generate recommendations based on consumers' desired product attributes. Collaborative-filtering recommendation agents produce results that are similar to 'word-of-mouth'. They generate recommendations by quoting the opinions of like-minded people (Xiao and Benbasat, 2007). Hybrid recommendation agents combine features of content-filtering with features of collaborative-filtering. This research will focus on the application of hybrid recommendation agents.

2. LITERATURE REVIEWS AND RESEARCH MODEL

2.1 Flow Theory

Csikszentmihalyi (1977) defined 'flow' as 'the holistic sensation that people feel when they act with total involvement'. When people enter into flow states, they feel deep enjoyment, happiness, and exhilaration (Csikszentmihalyi, 1990). During flow states, people become immersed in activities, fully control their actions, centre their focus of awareness, and lose their self-consciousness. This concept has been applied in the computer-mediated communication environment (Csikszentmihalyi, 1990; Hoffman and Novak, 1996) that includes web surfing, content navigation, browsing for information (e.g. Skadberg and Kimmel, 2004), online chatting, online gaming (e.g. Choi and Kim, 2004), and shopping in online shopping environments (e.g. Koufair, 2002), and so on. Hoffman and Novak (1996) defined flow as 'a seamless sequence of intrinsic enjoyment facilitated by interactivity with computers, which is accompanied by loss of self-consciousness.'

2.2 Consequences of Flow Experiences

In general, flow experiences are considered affective states that primarily influence users' emotions (e.g. playfulness, enjoyment, or positive feelings). A review of the literature reveals that flow experiences might enhance users' positive attitudes, thoughts, and other behaviours (e.g. referral, revisiting, or shopping) towards systems (van Noort et al., 2012). Flow experiences also induce users' positive behaviours and intentions. For example, several studies have indicated that flow experiences may induce positive feelings, attitudes, and intentions (e.g. loyalty and usage) (Choi and Kim, 2004; Mathwick and Ridgon, 2004; Zhou and Lu, 2011), purchasing attitudes and intentions (Luna et al., 2002), learning intentions (Ho and Kuo, 2010; Pilke, 2004), as well as information usefulness and diagnosticity (Agarwal and Karahanna, 2000; Jiang and Benbasat, 2005). Hoffman and Novak (1996) indicated that, if users enter into stronger flow experiences, then they will feel greater satisfaction. They might

be more willing to learn. Agarwal and Karahanna (2000) explored flow experiences. The results of their study revealed that flow experiences might influence users' perceived usefulness and perceived ease of use. Jiang and Benbasat (2005) proposed that a positive relationship exists between flow and perceived diagnosticity. Therefore, we propose:

H1: Users' flow is positively associated with their perceived information usefulness toward recommendation agents.

H2: Users' flow is positively associated with their intentions to reuse recommendation agents.

2.3 Information Usefulness

Rabjohn et al. (2008) utilized the information adoption model in the context of computer-mediated communication. They stated that the reasons why users intend to adopt technology, ideas, or information are based on their beliefs about and valuations of the consequences of adoption. The information adoption model was proposed by Sussman and Siegal (2003). This model states that the likelihood that users will adopt information depends on their perceived benefits of the adoption of that information (i.e. information usefulness). Further, they stated users' perceived benefits derive from their evaluations of argument quality and source credibility. This information adoption model can also be applied to investigations of users' intentions to adopt recommendation agents. The likelihood that users will accept suggestions, guidance, and advice provided by recommendation agents depends on users' evaluations. If users believe recommendations are useful and if users experience comfort during the interactive process, they will be more willing to reuse recommendation agents. Therefore, we propose:

H3: Users' perceived information usefulness is positively associated with their intentions to reuse recommendation agents.

2.4 Antecedents of Flow Experiences

Csikszentimhalyi (1990) proposed a model entitled the 'Channel of Flow Experience', which stated that the most important dimension of flow theory lies in users' cognitive challenges during activities and in their skills. 'Flow' is experienced only when users believe their skills are sufficient to meet specific levels of effort required to achieve challenges (i.e. 'a balance of skills and challenges'). In addition, Massimini (1988) indicated that only a strong balance of users' skills and challenges can help users enter into states of flow. Thus, they will become more willing to engage in repeated use of recommendation agents.

In this study, we define the use of a recommendation agent to make a qualified decision during online shopping as a challenge. Therefore, if a recommendation agent could provide users with suitable assistance they could employ to increase their skills in the utilization of recommendation agents, then users could enter into states of flow. We propose that the extent of increased skills will depend on cues users receive and perceive during interactions with recommendation agents. Hybrid recommendation agents that combine content-filtering and collaborative-filtering filters were employed in this study. Therefore, we propose that recommendation agents could provide two kinds of assistance, including informational and affective cues. Informational cues include detailed descriptions that include the meaning and objectives of product attributes, as well as information related to other consumers' choices that

users can consult for reference. Studies have shown that a positive relationship exists between the provision of explanations and users' understanding and development of positive attitudes toward products, users' shopping enjoyment, as well as flow (e.g., Jiang and Benbasat, 2005, 2007). Affective cues derive from users' perceptions of similarities of the decision processes that operate between users and recommendation agents because perceived similarity induces users' identification with recommendation agents. Thus, users feel warmth and concern from recommendation agents. Therefore, we must discuss explanation facilities, consumer reviews, and perceived process similarities.

2.4.1 Explanation Facilities

Explanation facilities can make the whole mechanism of recommendation agents more transparent to their users by providing users with detailed information and explanations about why recommendation agents ask certain questions and about how these agents process information to reach their conclusions (Gregor and Benbasat, 1999). The utilization of explanation facilities have been investigated in the context of recommendation agents. They are considered one of several effective methods that can be used to communicate decision processes to their users (e.g. Al-Natour et al., 2008; Wang and Benbasat, 2007). Users could increase their understanding of recommendation agents and, as a result, compare differences that exist between recommendation agents and themselves. The provision of additional information might increase users' abilities to make decisions. This would include evaluating the recommendation agents' competence, and obtaining additional product information. This might result in improvements in users' abilities to more easily enter into flow states, from the perspective of flow theory. Therefore, we propose:

H4: The existence of explanation facilities is positively associated with users' flow experiences with recommendation agents.

2.4.2 Informational Cascade

Information cascade theory proposes that decision makers usually rely on two sources of information: One source consists of information based on their own knowledge or any information related to products. The other source consists of information derived from others' adoption decisions (Bikhchandani et al., 1992). An informational cascade occurs when the influence of others' decision outweighs the influence of decision makers' own information (Bikhchandani et al., 1992). Consumer reviews are generated from customers' spontaneous behaviours. These reviews aim to share consumers' experiences and perceptions of the purchase and use of products. Consumer reviews serve as supplemental information sources, along with other information such as product descriptions and attributes, reviews from experts, and personalized advice generated by recommendation agents (Mudambi and Schuff, 2010). Studies have demonstrated that consumer reviews serve as important cues that can assist users to make better and easier choices (Dabholkar, 2006; Huang and Chen, 2006). Studies have demonstrated that consumer reviews could save users significant amounts of effort (Smith et al., 2005). Users may be attracted by online consumer reviews. They might spend additional time on web sites and, in turn, enter into flow experiences (Mudambi and Schuff, 2010). Therefore, we propose:

H5: The existence of consumer reviews is positively associated with users' flow experiences with recommendation agents.

2.4.3 Perceived Process Similarity

Users are usually attracted to others when they believe those others are similar to themselves (Al-Natour et al., 2008). Byrne et al. (1967) stated that similarity may be attractive because two interactive partners may share similar beliefs. This will reduce conflicts and disagreements between the partners. Based on the views of Byrne et al. (1967), Berscheid and Walster (1978) stated that perceived similarity may create pleasurable and enjoyable interactions, easy communication, predictability, and positive attitudes. It may also reduce potential conflicts (Berscheid and Walster, 1978). Al-Natour et al. (2006) proposed that the influence of similarity on the use of recommendation agents is based on effectance arousal, uncertainty reduction, and pleasurable and enjoyable interactions. During interactions, when users perceive that other parties are similar to themselves, they are more willing to maintain these relationships because of effects, credibility, and playfulness (Al-Natour et al., 2006). We believe that users perceive similarities with others and experience pleasure and enjoyment. Enjoyment is a factor that occurs during flow experiences (Zhou and Lu, 2011). Al-Natour et al. (2008) proposed that perceived similarity consists of decision process similarity and decision outcome similarity. In this study, we focus on decision process similarity because we want to emphasize the interaction process. Therefore, we propose:

H6: Users' perceived process similarity is positively associated with their perceived flow experiences with recommendation agents.

2.5 The Influence of Product Knowledge

Product knowledge is critical to understand behaviors related to information search, information processing, and decision-making (e.g., Al-Natour et al., 2008). Users' product knowledge refers to the level of understanding and involvement about attributes of goods users plan to buy. Users with high product knowledge are usually defined as experts, whereas those with low domain knowledge are usually defined as novices. Experts are able to articulated preference information and more likely to undergo extensive alternative-based processing (Chernev, 2003) and develop their own strategies (King and Balasubramanian, 1994). On the contrary, novices are lack of 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). Al-Natour et al. (2008) proposed that users' product knowledge moderates the relationship between decision process and outcome similarity and acceptance, satisfaction and trust of decision aids.

H7a: The relationship of explanation facility and flow is moderated by users' product knowledge. The influence of explanation facility on flow in expert group is lower than in expert group.

From the information cascade theory, decision makers will evaluate their private information and others' decision and behavior by observation when they make decision. If decision makers think they are knowledgeable about this issue, they will follow their own information, and otherwise they conform to others' action. If decision makers' knowledge is limited and recommendation agents present signals of information cascade, they will tend to reuse recommendation agents.

H7b: The relationship of consumer review and flow is moderated by users' product knowledge. The influence of process similarity on flow in expert group is lower than in expert group.

Experts are able to identify process similarity than novices because experts are more involved in product information. Accordingly, we propose:

H7c: The relationship of process similarity and flow is moderated by users' product knowledge. The influence of process similarity on flow in novice group is lower than in expert group.

The proposed research model is shown in Figure 1.

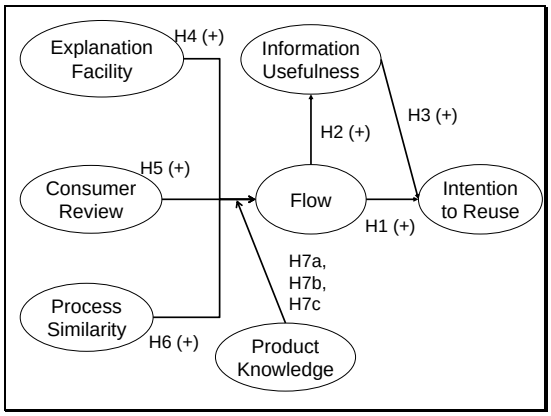

Figure 1. Research model.

3. RESEARCH METHOD

3.1 Operationalization and Instrument Design

The instruments used for constructs were adapted from related literature. They were revised to fit our research context. The operational definitions of measurement constructs are shown in Table 1. All items were anchored on five-point Likert scales that ranged between strong disagreement and strong agreement. A short interview was conducted with several colleagues and experts. In addition, a pre-test were conducted to ensure face validity and content validity for the compliant questionnaires. Explanation facility was performed by the use of a 'why' explanation which describes the meaning and the importance of each attributes to selecting products (Wang and Benbasat, 2007). We followed the presentation format employed by Duan et al. (2009) to demonstrate the situation involved in the 'informational cascade'. It was based on consumers' ratings that ranged from one star to five stars, as well as on the total number of consumers' ratings for one product. Based on Al-Natour et al. (2006), we designed two recommendation agents' decision strategies for the provision of shopping suggestions, including additive compensatory (AC) and elimination by aspect (EBA) strategies. Bettman et al. (1998) stated that a continuum for decision strategies exists that ranges between completely

normative and completely heuristics. The AC Strategy is most closely aligned with normative strategies. Individuals who employ the AC strategy evaluate alternatives based on their assignment of weights and scores for each attribute (Al-Natour et al., 2006; Bettman et al., 1998). The EBA strategy is most closely aligned to heuristics strategies. Individuals who employ the EBA strategy compare attributes' values against user-specified threshold levels across all alternatives (Al-Natour et al., 2006; Bettman et al., 1998). The design of decision strategies is used to measure users' perceived process similarity.

Table 1. Operationalization of constructs.

Construct	Definition
Process similarity	The extent to which users perceive similarity between their reasoning, the decision process, and the decision processes of recommendation agents (Al-Natour et al., 2008).
Flow	The degree to which users are interested in interacting with a system, are curious about the interaction, have full control over the interaction, and are focused on the interaction with no other distractions (Choi and Koh, 2004).
Information Usefulness	The extent to which users perceive the helpfulness and value of information (Cheung et al., 2008).
Intention to Reuse	The extent to which users are willing to adopt RAs to obtain shopping advice after an initial use (Al-Natour et al., 2008; Wang and Benbasat, 2005).

3.2 Experimental Design and Data Collection

To examine the effects of explanation facility and informational cascade on flow, a 2×2 factorial experimental design was employed. Explanation facility and informational cascade were employed in the experimental treatment on two levels: with and without descriptions. The description of the 'why' explanation appeared below each feature. Consumers' reviews (for the performance of the information cascade) were placed at the top of each product description of the products users chose. The design of the manipulation of perceived process similarity was based on decision strategies described in Al-Natour et al. (2008). Two sets of recommendation process decisions were designed. They contained AC (close to completely normative) and EBA (close to completely heuristics) decision strategies. Participants were assigned into one set based on their final decisions. Descriptions were listed after they made a decision. Each subject was classified as an 'expert' or 'novice' customer based on his or her score on 15 true-or-false questions based on information taken from PCDIY magazine, and we held discussions with individuals who had extensive knowledge of digital cameras. Answers judged correct were given a score of '1' by the system. Incorrect or uncertain answers were assigned a score of '0.' We calculated the scores through the system.

For this experiment, an artificial recommendation agent was designed to provide recommendations for digital cameras based on participants' preferences and requirements. We proposed the use of ten candidate digital cameras in this experiment. We designed a scenario for participants and asked them to choose an optimal alternative based on requirements in the scenario. Participants were randomly assigned into one setting of four combinations of explanation facility and consumer reviews. When participants chose products based on

recommendations, we provided descriptions and consumer reviews of those products selected by participants, as well as the decision recommendations that were most appropriate to the scenario. We explained reasons derived from the AC or EBA decision strategies. Participants could repeatedly operate the recommendation agents until they found qualified products. Upon completion of the tasks, participants were asked to complete self-administered questionnaires that included measurement items related to process similarity, flow, information usefulness and intentions to reuse.

We performed a pilot test to insure the appropriateness of experimental procedures. We posted invitations to participate on the BBS of Chang Gung University during a one-week period. Participants were self-selected for this study via the posted messages. However, they were required to have experience with the use and purchase of digital cameras. During this period, 183 participants were recruited for the experiment. After examining data, only 166 records were used for the data analysis.

4. DATA ANALYSIS AND RESULTS

4.1 Measurement Model

The measurement model was assessed by the use of a confirmatory factor analysis that used LISREL 8.8.Factor loadings of indicators were all above the acceptable level of 0.5 and were significant ($p \leq 0.01$) after the deletion of three measurement item related to the construct of 'flow'. The fit indices were all above the threshold. These results reveal the acceptability of the construct validity. Reliability and convergent validity were acceptable when compared with the threshold suggested by Bagozzi (1980): 0.7 and 0.5 respectively, as shown in Table 2.The discriminant validity was acceptable based on the rule that the correlations between any two distinct constructs were lower than the square root of the average variance extracted from these constructs (Fornell and Larcker, 1981), as shown in Table 2.

Table2. Reliability, convergent validity and discriminant validity.

	Composite Reliability	Average Variance Extracted	Cronbach's Alpha	Process similarity	Flow	Information Usefulness	Intention to reuse
Process Similarity	0.91	0.76	0.80	0.87	—	—	—
Flow	0.89	0.74	0.80	0.72	0.86	—	—
Information Usefulness	0.93	0.82	0.84	0.61	0.85	0.90	—
Intention to Reuse	0.97	0.88	0.92	0.61	0.85	0.88	0.94

Note: Diagonal represents square root of AVE of each construct

4.2 Hypotheses Testing

Two steps were performed to test hypotheses. First, H4 and H5 were examined by the performance of an ANOVA test. Second, H1, H2, H3, and H6 were examined based on the Structural Equation Model (SEM) using LISEL 8.8. H1, H2, H3, and H6 are supported and presented in Figure 2. Flow directly and indirectly enhanced users' intentions to reuse recommendation agents. Information usefulness served as an important mediator between flow and reuse intention. Process similarity positively influenced flow. The results revealed that process similarity only affected information usefulness mediated by flow experience. The explained variances of intention to reuse recommendation agents, information usefulness, and flow were 82%, 72%, and 53%, respectively. The fit indices were all above the threshold, as shown in Table 3.

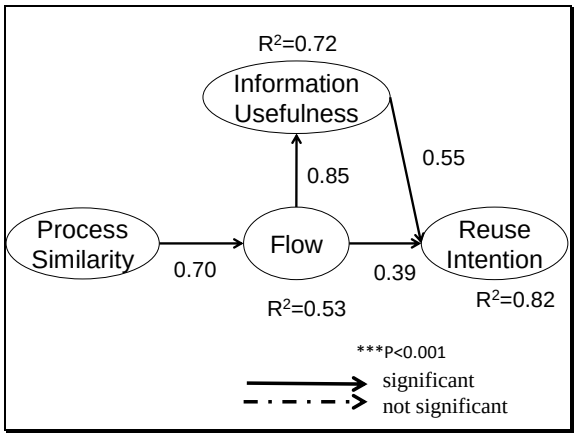

Figure 2. Structural model – Main effect (SEM).

Table 3. Fit index of structural model

	x^2/df	GFI	IFI	CFI	RMSEA	Standardize RMR
Score	2.08	0.89	0.95	0.95	0.06	0.06
Threshold Value	< 3	> 0.8	> 0.9	> 0.9	< 0.08	< 0.08

The results of H4 and H5 are shown in Table 4. The existence of explanation facility and consumer reviews influenced users' perceived flow experiences under 0.05 and 0.1 significant levels, respectively. However, users perceived higher flow experiences in the situation that did not include explanation facility than they did in the situation that included explanation facility. This relationship was opposite to our expectations. Users perceived higher flow experiences when they were provided with the number of purchasers, rather than when they were not provided with this information. Thus, H4 was unsupported. However, H5 was supported.

Table 4. ANOVA results for Flow.

Flow		Mean	S.D.	N	F value	Sig.
Explanation Facility	With	3.144	0.090	83	4.728	0.031
	Without	3.421	0.090	83		
Consumer Reviews	With	3.394	0.092	79	3.071	0.082
	Without	3.171	0.088	87		

The results of H7a, H7b, and H7c are shown in Table 5. The scores in the 'expert' group are equal and greater than 7. The scores in the 'novice' group are less than 7. Only the moderating effect of domain knowledge on association of process similarity and flow is significant, i.e. H7c. Experts' flow experience is higher than novices' when they perceived high process similarity. On the contrary, experts' flow experience is lower than novices' when they perceived low process similarity. H7a and H7b are unsupported. Both Novices' and Experts' flow experience is not statistically different between with and without explanation facility. Both Novices' and Experts' flow experience is also not statistically different between with and without information cascade.

Table 5. ANOVA results for Moderating Effects of Domain Knowledge.

		Product Knowledge						F value	Sig.
		Novices			Experts				
		Mean	S.D.	N	Mean	S.D.	N		
Explanation Facility	With	3.32	0.66	61	3.31	0.96	31	0.05	0.83
	Without	3.50	0.60	51	3.44	0.97	40		
Information cascade	With	3.45	0.64	60	3.50	0.98	32	0.21	0.647
	Without	3.34	0.63	52	3.33	0.95	39		
Process Similarity	High	3.70	0.61	36	4.00	0.70	30	8.011**	0.005
	Low	3.26	0.60	76	2.93	0.88	41		

5. DISCUSSION AND IMPLICATIONS

5.1 Conclusions and Implications

Flow theory states that a highbalance between skills and challenges can induce users' flow experiences and, in turn, increase users' positive attitudes and intentions to use and reuse recommendation agents. Out of the six hypotheses proposed in this study, H1, H2, H3, H5, H6, and H7c were supported. The results of the examination performed on H4 were statistically significant. However, the direction was opposite to our expectations. We determined three main findings based on these results.

First, flow, which is usually discussed from the hedonic viewpoint, is important for users' intentions to reuse recommendation agents. Flow does not solely exert direct influence on reuse intentions. It also indirectly affects reuse intentions mediated by information usefulness. In general, prior studies investigated antecedents of reuse intentions from a utilitarian

viewpoint. Our results demonstrate that users who strongly devote themselves to the use of recommendation agents are more willing to reuse recommendation agents, even if they make their own shopping decisions for utilitarian products. Users develop positive feelings towards recommendation agents. Then, they consider utilitarian benefits, such as usefulness. Hence, explorations of the antecedents of flow might provide valuable results.

Second, increasing users' abilities to face challenges and utilize recomendation agents to make good decisions will induce users' flow experiences. Users who perceive process similarity and read consumer reviews could enter into states of flow. In turn, they might be more willing to consider the usefulness of suggestions and reuse recommendation agents. Users' identification with the decision process employed by recommendation agents may induce their willingeness to devote time and effort to interact with recommendation agents. Users' efforts to read other users' product reviews may provide affective hints and contribute to users' confidence in their choices. Explanation facility may depress users' positive feelings. It is possible that users may feel overwhelmed by the amount of detailed information that provides descriptions of product attributes. They have to invest time and care to read explanations. This may detract from feelings of ease and pleasure users experience during interactive processes. Pu and Chen (2007) found that recommendation agents that provide detailed explanations of product attributes decrease users' cognitive efforts during decision-making.

Third, process similarity is more important than explanation facility and consumer reviews during the interactive processes. When users agree with the decision processes of recommendation agents, they may be more willing to interact with recomendation agents. They will then value the suggestions made by recommendation agents. Hence, understanding users' recognition of inference logics that occur during decision-making is very important. Especially, the effect of process similarity is influenced by users' understanding about the target product. Experts' flow experience is more influences by process similarity than novices'. Apparently, the association of process similarity and flow experience exists for novices, but there must be other determinants which increase novices' flow experience much more.

Based on these findings, we can offer two academic implications. **First**, the results support the application of flow theory with respect to users' intentions to reuse recommendation agents. Recent studies have emphasized the contents of and inferences included in recommendations. However, this study highlights the importance of users' attitudes and feelings during the interactive process. **Second**, prior studies investigated the influence of process similarity on usability of and trust in recommendation agents. However, this study highlights the fact that process similarity also exerts emotional influences, such as the inducement of flow experiences. Users perceive similarity between their reasoning processes and the reasoning processes of decision aids. They may become interested in the ways that recommendation agents operate and, as a result, become devoted to the interactive processes involved.

5.2 Managerial Implications

Our findings imply three suggestions for managers. First, managers could attempt to increase users' absorption in the use of recommendation agents. If users experience time distortion and solely concentrate on recommendation agents, they will be more willing to consider suggestions as valuable information. Thus, they will reuse recommendation agents again in the

future. Second, managers could treat similarity as a critical factor that might indirectly increase users' reuse intentions. Managers could attempt to increase users' agreement with decision-making procedures used by recommendation agents. This may induce users' flow experiences with recommendation agents. Further, managers could try to understand users' level of product knowledge because the influence of process similarity on flow experience is stronger for experts than novices. Third, the provision of hybrid recommendation agents can improve users' positive feelings and increase their reuse intentions by providing consumer reviews and suggestions based on users' preferences.

5.3 Limitations and Suggestions for Future Research

This research had some limitations. First, this study used ten most popular and common digital cameras. The types, quantities, and brands offered on the website were limited. These issues must be addressed in future research. Second, we only considered process similarity in this study. Outcome similarity also influences users' perception towards electronic service in literatures. Outcome similarity may be included in future research. Third, our sample was solely comprised of students. Future research should include participants drawn from wider age ranges.

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