EXPLORING ADOPTION INTENTION TOWARDS RECOMMENDATION AGENTS AND UNPLANNED PURCHASE BEHAVIOUR: INVOLVEMENT AND INFORMATION CASCADES AS MODERATORS

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Abstract

Research indicates that in order for customers to properly utilize recommendation assistants (RA), they must trust the RA and enjoy the interface. However, methods for increasing user enjoyment of RAs are yet unknown. This study investigated the influences of utilitarian and hedonic factors on intention to adopt RA suggestions and the antecedents of outcome similarity and web atmospherics. User motives and attitudes towards RAs could influence their interest in features recommended by RAs. Contrary to common assumptions, customers may make unplanned purchases, rather than rational purchase. In accordance with information cascade theory, this study investigated relationships of unplanned vs. planned purchase decisions. A 2×2×2 factorial design revealed three main findings. First, information diagnosticity and enjoyment positively affected intention to adopt RA suggestions. Diagnosticity was determined by outcome similarity, and enjoyment was determined by both outcome similarity and atmospherics. Second, involvement moderated the association between adoption intention, diagnosticity, and enjoyment. Highly involved users considered enjoyment and diagnosticity when forming adoption intentions, while users with low involvement only considered enjoyment. Third, information cascades altered the relationship between adoption intention and unplanned purchases such that information cascades negated a positive relationship between adoption intention and unplanned purchases. Theoretical and managerial implications are proposed.

Keywords: Intention to Adopt RAs as Decision Aids, Unplanned Purchase Behaviour, Enjoyment, Information Diagnosticity, User Involvement, Information Cascade
1 INTRODUCTION

Customers are presented with so much information about products and services on the Internet that they are unable to adequately assess product information. Online users cannot consult with salespeople as they would in a retail store (Kim and Yoo, 2000). Under these circumstances, consumers are unable to process information when the input exceeds their capacity (Chen et al., 2009). Recommendation agents are software agents that elicit the consumer interests and preferences and past shopping habits of individual users, either explicitly or implicitly, and make personalized recommendations accordingly (Xiao and Benbasat, 2007). Recommendation agents (RAs) are recognized as effective assistants for improving decision-making quality based on users’ preferences, shopping history, or choices made by other customers (Wang and Benbasat, 2007). However, consumers may rely on their own collections of information searching, rather than follow RAs’ suggestions. Even when customers take great care in choosing products, they still risk failure in decision making.

One stream of research approaches RAs as social actors and explores their interactions with users. This research considers the influence of users’ positive attitudes toward and perceived benefits of RAs, which include reduced cognitive effort, perceived usefulness, satisfaction, and trust (e.g. Häubl and Trifts, 2000; Kao and Huang, 2010; Su et al., 2008; Wang and Benbasat, 2007). This approach proposes that users will rationally evaluate the capabilities of RAs based on interaction processes, similarity between the real and virtual worlds, and consequences from a utilitarian perspective. Some studies create simulated shopping environments based on the real world to explore the emotional effects induced by the simulated environments on customer trust (e.g. Kao and Huang, 2010; Qiu and Benbasat, 2009). Kao and Huang’s (2010) study demonstrated that emotional trust, influenced by social presence, increases customers’ reuse intention.

Most studies have focused on utilitarian processes to investigate users’ intentions and behaviour in using and adopting RAs. However, few empirical studies have addressed this issue from a hedonic perspective. The importance of enjoyment in user intention and loyalty has been demonstrated (e.g., Davis et al., 1992; Pullman and Gross, 2004). If customers enjoy the interaction process, they tend to have playful moods and feel satisfied with the website; in turn, they are willing to revisit the site. In consideration of prior research, we believe that utilitarian and hedonic perspectives are each important in the evaluation of information and perceived competence of RAs. In addition to rational assessment, customers enjoy playful and fun interactions. Thus, we hypothesize that customers’ use of RAs will influence relative significance of utilitarian and hedonic values on intention to adopt information provided by RAs.

Customers generally utilize RAs for planned purchases. They decide whether to adopt information as decision aids and complete their purchase after careful evaluation. However, customers may in fact purchase a product different from that recommended by an RA, but not because of an unsuitable or poor recommendation from the RA. Rather, customers often make impulse purchases. Verhagen and van Dolen (2011) stated that customers often make impulsive decisions online, and that impulse purchasing occurs in about 40% of all online expenditures. Impulse buying has substantial consequences; thus, it is important to understand the nature of such online buying behaviour. Several studies have investigated the determinants of online impulse purchases and RA usage on product selection processes (Hostler et al., 2010; Verhagen and van Dolen, 2011). Various studies have explored the determinants of impulse buying including emotional factors (arousal and playfulness/enjoyment) (e.g., Adelaar et al., 2003; Verhagen and van Dolen, 2011), prices (Jeffrey and Hodge, 2007), web elements (Parboteeh et al., 2009), and web quality (Wells et al., 2011). Hostler et al. (2011) examined the effect of RAs on impulse buying and found that product promotion and search effectiveness are important in unplanned purchase behaviour. However, they did not consider the influence of the interactive environment. For example, customers may plan to purchase a specific product after extensive research, but they may change their minds and purchase a different item at the store because they observe other customers’ purchasing behaviour, receive a recommendation or
complaint about some products, see posters of top-selling items, or other factors. The information embedded in the environment influences customer decision making.

Accordingly, this study investigated three research questions.

1. What antecedents will improve customers’ intention to adopt suggestions as decision aids? Are information diagnosticity and enjoyment critical to adopt RA recommendations as decision aids?

2. Do rational and emotional paths act simultaneously in forming customers’ intention to adopt RA recommendations? Do varying levels of involvement in RAs influence the relative importance of rational and emotional paths on customers’ intention to adopt suggestions as decision aids?

3. Which determinants influence changes from planned to unplanned purchases?

2  CONCEPTUAL BACKGROUND AND HYPOTHESES

2.1  Information diagnosticity

Customers usually collect product information to gain knowledge prior to making a final purchase decision. However, customers are limited in the amount of product information they can process due to limits on cognitive processing (Wang et al., 2007). Feldman and Lynch (1988) proposed that the effect of a given piece of information on customer decision making is contingent upon the diagnosticity and accessibility of the information. Information is high in accessibility if it is easily retrieved, easily noticed, easily embedded into customers’ memory, and is presented in an attractive manner (Wang et al., 2007). Information diagnosticity is defined as users’ perceived ability to assess relevant product information presented on the website, understand suggestions proposed by a website, and evaluate the quality of website decision aids (Jiang and Benbasat, 2005). If customers think that product information provided by RAs suits their needs, they will be able to evaluate whether the product satisfies their needs (Wang et al., 2007) and then be willing to adopt suggestions proposed by RAs. Empirical studies (e.g., Jiang and Benbasat, 2005) suggest a positive relationship between information diagnosticity and customer decision-making. McKinney et al. (2002) demonstrated that information diagnosticity improves its understandability, and increases user satisfaction with that system. Jiang and Benbasat (2007) demonstrated the influence of information diagnosticity on attitude toward products, which in turn increased users’ intention to return. Before adopting RA recommendations, users will evaluate the perceived competence of RAs and decide whether the suggestions satisfy their needs. Hence, information presented by RAs must be easily accessed and understood. In such cases, users will adopt a positive attitude after evaluating RAs, consequently increasing their willingness to rely on them. Accordingly, if customers perceive a high degree of information diagnosticity, they will tend to rely on RAs and be more receptive to RA recommendations. Thus, we proposed the following hypothesis.

H1: Users’ perceived information diagnosticity is positively associated with their intention to adopt RAs as decision aids.

2.2  Outcome similarity

Based on the similarity-attraction hypothesis, customers are usually attracted by others perceived as similar to them (Al-Natour et al., 2008). Al-Natour et al. (2006) proposed that interactions between customers and RAs are similar to real-life interactions, and that perceived similarity affects customers’ usage and evaluation of RAs as a function of positive reinforcement. Berscheid and Walster (1978) indicated that similarity induces pleasurable and enjoyable interactions. Accordingly, people will have a good attitude, confidence, and feelings of enjoyment toward others who are similar to them. Empirical studies demonstrate the influence of perceived similarity on users’ feelings of trust and perceptions of usefulness, and their intent to reuse RAs (Al-Natour et al., 2008). Al-Natour et al. (2008)
proposed that perceived similarity to RAs consists of decision-process similarity and decision-outcome similarity. Process similarity is defined as users’ perception of the similarity between their reasoning and decision process and that of the RA; outcome similarity is defined as users’ perception of the similarity between their decision outcome and that of the RA (Al-Natour et al., 2008).

Information has high diagnosticity when the customer feels that the presented product information allows for a better assessment of the product based on the accessibility-diagnosticity model which is developed by Herr et al. (1991). If users perceive that the information presented by an RA is similar to their decision outcome, they will deem the RA useful (Al-Natour et al., 2008). We believe that information diagnosticity is the first step to perceived usefulness. Users must first be able to adequately evaluate RAs; this can in turn increase user trust in the usefulness of decision aids. Al-Natour et al.’s (2008) study reveals the positive association between process similarity and perceived trust in and usefulness of decision aids. Their study also demonstrated a direct influence of outcome similarity on perceived RA usefulness. Huang and Kao’s (2011) study found a direct relationship between outcome similarity and users’ perceived information diagnosticity, while the influence of process similarity on information diagnosticity was much smaller than that of outcome similarity. Perceived outcome similarity focuses on the confirmation bias of an outcome, and is related to the confirmation of users’ expectations. An enjoyable, credible interaction process will increase users’ willingness to maintain the relationship, even if they make a different decision. Accordingly, we believe it is more likely that perceived outcome similarity influences users’ perceived information diagnosticity and enjoyment. Thus, we proposed the following hypotheses.

**H2:** Outcome similarity is positively associated with users’ perceived information diagnosticity toward RAs.

**H3:** Outcome similarity is positively associated with users’ perceived enjoyment during interaction with RAs.

### 2.3 Web atmospherics and enjoyment

Atmospherics are defined as ‘the consciously designing of buying environments, in which customers’ specific emotional feelings and visual and non-visual senses, e.g., acoustic and olfactory sense, are aroused, could enhance customers’ purchase probability’ (Koo and Ju, 2010). Strong atmospherics elicit positive attitudes in customers, increasing the likelihood that they will revisit the website. Koo and Ju (2010) stated that the conscious design of web environments primarily aims to increase favourable consumer responses such as promotion, revisiting, prolonged browsing, purchasing, or information adoption. In addition, Koo and Ju (2010) proposed that the entire online retail store is constrained to visual appeal and sound. Schultz (2005) proposed that good web design, such as graphic titles, colourful buttons, or decorative fonts, could increase users’ good impressions and feelings. Website design aesthetics induce a good first impression and promote customer interest, in turn increasing customers’ willingness to lengthen their stay on the site. Koo and Ju (2010) explored the influence of web atmospherics (graphics, colours, links, and menus) on emotional responses and found that only graphics, colours, and links increased customer pleasure, similar to results from Eroglu et al.’s (2003) study in which the atmospherics of an online store had a positive impact on pleasure, but not arousal. The RA’s environment will influence customers’ perception, emotions, and feelings. Thus, we propose that good web atmospherics will increase customers’ enjoyment when using RAs.

**H4:** Web atmospherics are positively associated with users’ perceived enjoyment during interaction with RAs.

Enjoyment is defined as users’ perceived happiness during the use of information systems (Davis et al., 1992). Menon and Kahn (2002, p.32) defined pleasure as ‘the degree to which a person feels good, happy, or satisfied in a situation’. The influence of enjoyment on customer attitude, intention, and behaviour in online shopping has been demonstrated in the literature (e.g., Ha and Stoel, 2009). Lin et al. (2010) proposed that one source of experiential enjoyment is the transaction process itself. Cyr et al.
(2006) stressed that e-tailers should design web pages with both utilitarian and hedonic features so as to create a comfortable environment and allow customers to enjoy themselves. Koo and Ju (2010) demonstrated the positive relationship between pleasure and online shopping intention. Accordingly, we propose that customers will tend to accept the services of RAs (that is, adopt information as decision aids) if they enjoy their interactions with RAs.

**H5: Users’ perceived enjoyment during interaction with RAs is positively associated with their intention to adopt RAs as decision aids.**

### 2.4 Involvement – Elaboration Likelihood Model (ELM)

Petty and Cacioppo (1981, 1986) advocate the elaboration likelihood model (ELM), which suggests that a person processes persuasive messages and changes attitudes through elaboration approaches. Interactions between customers and RAs are similar to real-world sales interactions. Salespeople suggest appropriate products for customers by explaining why and how the recommended product suits the customer. This process is akin to persuasion, where salespeople try to alter customers’ beliefs, attitudes, or behaviour.

The ELM states that information processing (central and peripheral routes) in customer decision making depends on customer involvement (Petty and Cacioppo, 1981). Central (message-based) and peripheral (non-message based) routes process the same information in different ways according to their degree of involvement (Kwon and Chung, 2010; Park et al., 2007). When customers are highly involved in actively gathering information, considering detailed information within a given message, and assessing the quality and usefulness of information, persuasion occurs via the central route. Conversely, when customers lack involvement and interest in processing detailed information, the peripheral route will be the active processor. Peripheral processing emphasizes contextual factors rather than actual information content. Empirical studies have investigated customer satisfaction and decision-making processes from the ELM perspective (Lee and Kwon, 2008; Tam and Ho, 2005).

Involvement is defined as the individual’s perceived relevance of extrinsic events/objects based on inherent needs, values, and interests (Zaichkowski, 1985). Involvement, which is formed by the presence of situational and/or intrinsic self-relevance (Hoffman and Novak, 1996), affects attention and comprehension efforts (Celsi and Olson, 1988). Specifically, the degree of involvement is directly correlated with the perceived relevance of extrinsic events/objects. The extrinsic event/object could be a product, an advertisement, purchase behaviour, or a topic/subject. Once users believe that events/objects are important and meaningful, they tend to pay more attention to them. Involvement, which plays an important role in customer behaviour, has been used to explain customer decision making and responses to advertising and products (Wang and Doong, 2010). Wang and Doong (2010) demonstrated that customers highly involved with RAs are more willing to adopt recommendations in their decision-making process.

Accordingly, we proposed that customers with high involvement in using RAs will pay more attention to detailed product information provided by RAs. Further, such customers will evaluate this information carefully and have a greater intention to adopt the information for their purchase decisions. In contrast, customers with low involvement in using RAs will pay more attention to the environmental factors of web pages and their emotional experience, and in turn have a greater intention to adopt recommendations of RAs in their purchase decisions. Hence, we proposed the following hypotheses.

**H6: The influence of users’ perceived information diagnosticity on their intention to adopt RAs as decision aids is stronger when users are highly involved with RAs.**

**H7: The influence of users’ perceived enjoyment on their intention to adopt RAs as decision aids is stronger in the lower degree of users’ involvement in RAs.**
2.5 Unplanned purchases and information cascade

Stern (1962) defined an unplanned purchase (identical to an impulse purchase) as ‘any purchase which a shopper makes but has not planned in advance’. Verhagen and van Dolen (2011) described two prerequisites for impulse buying. First, impulse buying is unplanned, lacks cognitive deliberation, and generally occurs when customers have an urge to buy a specific product without carefully considering the reasons for and consequences of the purchase. However, after purchasing the product, customers could not explain why they could not resist the attraction at that time. Second, the impulse buying process is dominated by emotions (Verhagen and van Dolen, 2011). During the process of impulse buying, customers could not form cognitive-structured attitudes or intentions; rather, they were compelled by their feelings and unable to sustain reasons against the attraction of the product. Although emotion dominates cognition in impulse buying, it cannot fully preclude information processing.

Few studies have investigated issues of online impulse buying. Adelaar et al.’s (2003) study focused on emotional factors, and revealed a significant association between emotional arousal and impulse buying. Zhang et al.’s study (2007) utilized a modified TAM model and explored the influence of consumers’ general tendency for impulse buying. Parboteeah et al. (2009) demonstrated that web elements influence impulse buying, and that this effect is mediated by enjoyment. Wells et al. (2011) showed the direct influence of web quality on impulse buying. Verhagen and van Dolen’s (2011) study based on cognitive emotion theory revealed that the influences of merchandise attractiveness, enjoyment, and online store communication style on impulse buying were mediated by customers’ emotions. Verhagen and van Dolen (2011) confirmed information processing when customers engage in impulse buying, but they stress that the information processed by customers is derived from the shopping environment, rather than from product information collected in advance. Hostler et al. (2011) investigated whether product promotion effectiveness and product search effectiveness by RAs could induce unplanned purchases. Indeed, they reported that customers who are exposed to products other than those originally sought will tend to impulsively buy what they contact in the online shopping environment (Hostler et al., 2011).

We investigated the influence of customer usage of RAs during unplanned purchases and proposed that, even though customers accept RAs’ suggestions and plan to buy the recommended product, they will change their mind and spontaneously buy another based on information from their interaction with the web environment. The information may include other customers’ purchase behaviour, word of mouth, recommendations, or review comments on the products.

When users face too much information during the decision-making process, they usually imitate others’ behaviour, regardless of the information they have already collected (Bonabeau, 2004). Bikhchandani et al. (1992) described this process as informational cascades. Information cascades, positive network effects, word-of-mouth effects, and conformity preferences comprise the major mechanisms of herd behaviour (Bikhchandani et al., 1992). Information cascade theory states that decision makers usually have two sources of information: their own information based on their knowledge or any other product information, and information derived from the decisions of others (Bikhchandani et al., 1992). Customers imitate others’ behaviour because they consider others’ decision information as a positive signal, in turn dominating their own rational inference (Anderson and Holt, 1997). Consequently, this leads to following by subsequent decision makers, influencing them to adopt the same product with increasing momentum (Bikhchandani et al., 1992; Duan et al., 2009). Decision makers combine these two sources to make optimal decisions. The relative influence of these two sources of decision-making information is distinct, and varies with the amount and perceived value of user information. Based on information cascade theory and empirical studies, decision makers easily influenced by others’ opinions, preferences, attitudes, decisions, or behaviour will ignore the signals of their personal information. Accordingly, we propose that although customers have formed their intention to adopt a recommendation as an informational aid and choose products suggested by RAs, they may change their minds based on the previous behaviour of others presented
in the form of a star rating or sales volume presented on the web page. Hence, we propose the following hypotheses.

**H8:** The influence of users’ intention to adopt RAs on their unplanned purchase is affected by information cascade in RAs.

**H8a:** The influence of users’ intention to adopt RAs on their unplanned purchase is observed when they use the RA with information cascade.

**H8b:** The influence of users’ intention to adopt decision aids on their unplanned purchase is not observed when they use the RA without information cascade.

The research model as proposed is shown in Figure 1.

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**3 RESEARCH METHOD**

**3.1 Operationalization and instrument design**

The instruments used to measure relevant constructs were adapted from the literature and revised to fit the present research context. All items were rated along 5-point Likert scales that ranged 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 of the questionnaires. A pilot test was carried out to ensure the appropriateness of experimental procedures. Two treatment levels of web atmospherics (high and low) were designed. The web atmospherics features in this study included graphics, colours, and links (Koo and Ju, 2010). Graphics refers to users’ perception of beauty and comfort as induced by the appearance of pictures, animations, etc. Colours refer to users’ perception of a colourful, visually appealing interface. Links refers to the degree of convenience and succinctness of links within the website. Highly atmospheric websites were beautiful and colourful, with convenient links through which users could easily find desired pages. Minimally atmospheric websites had limited features in terms of graphics, colours, and links. A manipulation check was conducted based on data collected in the pilot test. Information cascade was the experimental treatment, presented with two levels: with and without other consumers’ rating. The rating was presented by ‘stars’, with from one start to five starts. Following Al-Natour et al.’s (2008) study, the treatment levels of outcome similarity were ‘match’ or ‘mismatch’, referring to the accordance between the RA suggestion based on the user’s choice during interacting with RAs and the RA’s own decision according to content of the task. After finishing the task, participants were asked to fill out questions for measuring the extent of their perception of similarity between the RA and themselves.

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*Figure 1. Research model*
Information diagnosticity is defined as the extent to which the recommendations from RAs convey product features based on user needs, which is adapted from Wang et al.’s (2007) study. Enjoyment is defined as the extent to which users feel pleasure, enjoyable, or happy in a specific situation (Cyr et al., 2006; Koo and Ju, 2010). Involvement is defined as the perceived relevance of extrinsic events/objects based on inherent needs, values, and interests ( Zaichkowsky, 1985). We adopt Zaichkowsky’s (1985) measurement items. Intention to adopt as decision aids refers to the extent to which a member is willing to depend on other members’ suggestions for decision making (Komiak and Benbasat, 2006). These four construct were measured by self-administrative questionnaires. Unplanned purchase behaviour is defined as ‘any purchase which a shopper makes but has not planned in advance’ (Stern, 1962). We followed Hostler et al.’s (2011) study and measured unplanned purchases by using data collected from participants prior to and during the second phase of the experiments. The difference represented the number of unplanned purchases.

3.2 Experimental design and data collection

We employed a 2×2×2 factorial design to examine the research model, with outcome similarity, atmospherics, and information cascade as the independent variables. An artificial RA was designed to make recommendations for digital cameras based on participants’ preferences and requirements in this experiment. As Wang and Benbasat (2007) reported, digital cameras were chosen because RAs for digital cameras have been developed commercially, and digital cameras are popular among undergraduate and graduate students. Additionally, digital cameras have complex features, a short life cycle, and a variety of brands and types on the market. An RA based on preferences and needs specified by customers was developed based on a hybrid method.

Participants were instructed to choose one digital camera based on a list of required features specified by the study in advance. We measured the degree of closeness and assigned participants into groups with ‘match’ or ‘mismatch’ outcome similarity. Then, participants were randomly assigned to one of four scenarios (high/low web atmospherics and presence/absence of information cascade) for completing experimental tasks. Participants were instructed to utilize the RA to select one camera for a good friend. Participants freely chose criteria for product selection based on their preference and requirements, and then browsed the specifications for the chosen digital camera. They could repeatedly operate the RAs until they found a qualified digital camera. Participants were asked to complete a web-based questionnaire which included items adapted from the relevant literature that addressed web atmospherics, outcome similarity, information diagnosticity, enjoyment, and intention to adopt information as decision aids. RAs in the information cascade group revealed the rating for digital cameras. All participants were allowed to change their minds and choose a new digital camera. The system recorded decision differences before and after the information cascade for participants in this condition.

Participants were recruited through the Internet. We posted messages to solicit participation on the boards of ‘ptt’, which is the most popular bulletin board system in Taiwan. Participants were required to have experience using and purchasing digital cameras. In order to motivate potential respondents to participate in the experiment, volunteers were given a chance to win a prize after completing the experiment. Over the course of three weeks, 165 participants were recruited for this experiment. Eighteen records were deleted because of monotonous answers, such as all ‘3’ or all ‘4’. One hundred and forty-seven records were included for analysis.
4 DATA ANALYSIS AND RESULTS

4.1 Measurement model

The measurement model was assessed by confirmatory factor analysis using LISREL 8.8. Factor loadings of indicators were all significant (p <= 0.01) and in the range of acceptance level, which is between 0.50~0.95 as suggested by Bagozzi and Yi (1988), as shown in Table 1. This demonstrates acceptable construct validity. The fit indices are all above threshold.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Mean</th>
<th>S.D.</th>
<th>Items</th>
<th>Factor Loading</th>
<th>T-Value</th>
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<td>Web_atm1</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td>Web_atm4</td>
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<td>0.92</td>
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<td>Out_sim3</td>
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<tr>
<td>Adoption Intention</td>
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<td>Enjoy5</td>
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<td>13.74</td>
</tr>
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</table>

Table 1. Factor loadings of constructs

The reliability and convergent validity are acceptable as compared to the threshold suggested by Bagozzi (1980): 0.7 and 0.5, respectively. The discriminant validity is acceptable based on the rule that the correlations between any two distinct constructs are lower than the square root of the average variance extracted of these constructs (Fornell and Larcker, 1981), as shown in Table 2.

<table>
<thead>
<tr>
<th></th>
<th>Composite Reliability</th>
<th>Average Variance Extracted</th>
<th>Web Atmospherics</th>
<th>Outcome Similarity</th>
<th>Adoption Intention</th>
<th>Information Diagnosticity</th>
<th>Enjoyment</th>
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<td>0.89</td>
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<td>0.91</td>
<td>0.15</td>
<td>0.64**</td>
<td>0.95</td>
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<tr>
<td>Information Diagnosticity</td>
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<td>0.88</td>
<td>0.28**</td>
<td>0.43**</td>
<td>0.59**</td>
<td>0.94</td>
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<tr>
<td>Enjoyment</td>
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<td>0.78</td>
<td>0.49**</td>
<td>0.38**</td>
<td>0.58**</td>
<td>0.58**</td>
<td>0.89</td>
</tr>
</tbody>
</table>

Table 2. Reliability and validity (diagonal represents square root of AVE of each construct)
4.2 Hypothesis testing

The structure model was analysed by structural equation modelling (SEM), hierarchical regression, and binary logistic regression. Three steps were performed for testing the hypotheses. First, the main effects were examined by SEM (H1–H5). Second, regression was conducted for testing H6 and H7. Third, an ANOVA was conducted to test H8. The results for the main effects are presented in Figure 2. H1–H5 were all supported. Outcome similarity positively affected information diagnosticity and enjoyment. Web atmospherics positively influenced enjoyment. Information diagnosticity and enjoyment positively affected intention to adopt RAs as decision aids. The proportions of explained variance for the intention to adopt RAs, information diagnosticity, and enjoyment were 59%, 38%, and 41%, respectively.

![Figure 2. Structural model – main effect (H1–H5)](image)

Hierarchical regression was conducted to test the moderating effect of involvement. We divided the sample into two groups based on involvement scores. The high involvement group (scores greater than mean of involvement score, 3.9) included 66 participants, and the low involvement group included 81 participants. The results are shown in Figure 3. H6 was supported, while H7 was unsupported. The association between information diagnosticity and adoption intention was not significant in the low involvement group, while the association was significant in the high involvement group. However, the relationship between enjoyment and adoption intention did not vary based on the degree of involvement.

![Figure 3. Structural model – moderating effect (H6 and H7)](image)
Binary logistic regression was conducted for testing the moderating effect of information cascade. The result is shown in Table 3. H8, H8a, and H8b were supported. Adoption intention positively influenced users’ unplanned purchase behaviour. The relationship between adoption intention and unplanned purchase behaviour was non-significant in the information cascade condition, while the relationship was significant in the non-information cascade condition.

<table>
<thead>
<tr>
<th></th>
<th>Numbers</th>
<th>Exp (B)</th>
<th>Significance (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>147</td>
<td>0.56</td>
<td>0.021</td>
</tr>
<tr>
<td>With Information Cascade</td>
<td>75</td>
<td>0.80</td>
<td>0.464</td>
</tr>
<tr>
<td>Without Information Cascade</td>
<td>72</td>
<td>0.22</td>
<td>0.004</td>
</tr>
</tbody>
</table>

Table 3. Results of binary logistic regression

5 DISCUSSION AND IMPLICATIONS

5.1 Conclusions and future research

This study aimed to explore users’ intention to adopt RAs as decision aids from utilitarian and hedonic views and relationship of adoption intention towards RAs and unplanned purchase behavior. It further considered the moderating role of involvement and product rating based on the perspectives of ELM and information cascade. It expects to compare the influences of RAs and other consumers’ behaviors on purchase decision-making. Out of eight hypotheses, seven hypotheses were supported. These results yielded four main findings.

First, utilitarian and hedonic factors are both important in the adoption of RAs as decision aids. Both information diagnosticity and enjoyment positively affected adoption intention toward suggestions provided by RAs. However, the influence of information diagnosticity is more important than enjoyment. Previous studies investigated antecedents of reuse intention from the utilitarian perspective. Our results demonstrate that users who perceive enjoyment during the process of using RAs are more willing to adopt RAs as decision aids. Hence, exploring antecedents of enjoyment will be crucial.

Second, the context of using RAs is also important to users. Although outcome similarity was precipitated by enjoyment and information diagnosticity, web atmospherics determined the degree of user enjoyment. If users believe that the website delivers a positive shopping atmosphere, they will enjoy the process of interacting with RAs. This finding reflects the real-world shopping experience. When consumers shop, they are more willing to enter a beautiful store. Third, involvement moderates the association between adoption intention, information diagnosticity, and enjoyment. Users with high involvement primarily considered enjoyment and information diagnosticity in forming adoption intention, while users with low involvement only considered enjoyment. Although the influence of information diagnosticity was greater than that of enjoyment, users with low and high involvement seriously considered enjoyment as a determinant of adoption intention. Conversely, users with high involvement paid more attention to information diagnostics. Fourth, results demonstrated that adoption intention leads to purchase behaviour. In addition, the relationship between adoption intention and unplanned purchases was affected by information cascade. In the absence of information cascade, adoption intention positively influenced unplanned purchases. With information cascade, there was no significant association between adoption intention and unplanned purchases. This finding demonstrates that ratings from other consumers play a critical role in influencing unplanned purchases.

These findings suggest three academic implications. First, enjoyment and web atmospherics increase user intention to adopt RAs as decision aids. Studies have generally investigated the content of recommendations; however, this study confirms that users’ feelings during the usage process are also very important. In particular, outcome similarity, a utilitarian factor, affects both rational attitude and
emotional feelings. This suggests that outcome similarity could induce users’ perception of identification and increase their enjoyment of the interaction process. Second, the moderating effect of involvement demonstrates that enjoyment is a necessary factor for increasing users’ adoption intention, regardless of the level of involvement. However, users who are highly involved in the product purchase consider both utilitarian (information diagnosticity) and hedonic (enjoyment) factors. Third, adoption intention could lead to users’ unplanned purchase behaviour. However, this relationship does not exist when users view rating information for the product of interest.

5.2 Managerial implications

Our findings lead to four suggestions for managers. First, managers could attempt to increase users’ enjoyment in using RAs by designing web pages that provide desirable atmospheres for shopping. If users enjoy the interaction process with RAs, they are more willing to view suggestions as valuable information, and then adopt the RA as a decision aid. Second, managers could treat outcome similarity as a critical factor in indirectly raising adoption intention. Outcome similarity not only delivers a professional image for an RA, but also increases users’ identification with the RA, in turn influencing users’ perceptions of information diagnosticity and enjoyment. Third, managers could attempt to understand users’ involvement in product purchasing and alter procedures accordingly, given that the influence of information diagnosticity on adoption intention is stronger for users with a high level of involvement than those with low involvement. Fourth, rating information exerts a significant influence on users’ purchasing behaviour. In origin, adoption intention leads users to buy one of the products suggested by an RA. However, the existence of product rating information influences users to move from their original decision toward that of the consensus. Managers could attempt to utilize the influence of product rating information and subsequently guide users to select the product presented by the RA.

5.3 Limitations

Due to limitations of this study, results should be treated with caution. First, data was collected by experiment. Treats to validity are unavoidable. External validity may be limited because of single target product, i.e. digital camera. We try to enhance external validity by collecting data from people on the Internet, rather than students. It is similar to field experiment. This way may lessen internal validity because we could not totally control experiment environment. But we try to eliminate this bias by restricting participants’ navigation and setting up some checkpoints for making sure participant followed the experimental procedure. Second, the doubts of self-selection maybe exist, since participants were volunteers and attracted by monetary incentives. But we tried to eliminate this bias by randomly assigning participants to eight experimental settings.

References


