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Consumer participation in using online recommendation agents: effects on satisfaction, trust, and purchase intentions

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Online product recommendation agents (RAs) are gaining greater strategic importance as a critical touch-point between marketers and consumers. Yet, the role of consumer participation in using RAs has not been examined. This study shows that greater consumer participation in using an RA leads to more satisfaction, greater trust, and higher purchase intentions, related to the RA and its recommendations. In contrast, the financial risk (associated with the product under consideration) reduces satisfaction, trust, and purchase intentions, and it also moderates the effect of consumer participation on these same variables. The findings extend the literature and suggest actionable implications for marketing strategy.

Keywords: online recommendation agents; satisfaction; trust; online shopping

Introduction

A key benefit of online shopping to consumers is reduced search costs for products and product-related information (Alba et al., 1997). With the Internet, consumers can compare prices, search for brands, and read other consumers' product reviews anytime, anywhere, and the information is easily available at their fingertips. But this benefit can become a cost when the amount and complexity of information exceed consumers' limited information-processing capacities (Dabholkar, 2006; West et al., 1999). In fact, consumers often cite Internet fatigue, a state in which consumers feel overwhelmed by the amount of information found on the Internet, as one of the most frustrating aspects of shopping online (Pew/Internet, 2008). As a result, consumers are faced with the dilemma between the need for more information on the one hand and the frustration with too much information on the other. Electronic screening tools such as online product recommendation agents (RAs) emerge as a possible solution to this dilemma, aiming to improve consumers' information search as well as decision making processes (Grenci & Todd, 2002; Maes, Guttman, & Moukas, 1999).

Online product RAs are based on software technology designed to understand consumers' interests as well as preferences and make product recommendations accordingly (Xiao & Benbasat, 2007). Similar to salespeople in brick-and-mortar stores, RAs on the Internet capture consumers' preferences and interests through browsing patterns or by eliciting inputs from consumers and initiating personalized, two-way dialogue with consumers. Through the RA–consumer interactions, marketers hope to better understand their customers

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and to guide as well as assist consumers in their information search and decision making processes. Realizing the strategic importance of RAs, marketers have begun to invest in equipping their websites with recommendation technology. For example, eBay bought Shopping.com, a comparison shopping website with high-end RA technology, for $620 million (Economist, 2005). Other e-business leaders such as Amazon and Yahoo have also implemented recommendation technology on their websites and made RAs easily available to consumers.

Although sophisticated RAs carry out the preference elicitation process through two-way dialogue with consumers, the quality and quantity of an individual consumer's input into the dialogue affects how well an RA can understand that consumer's preferences and interests. However, what information and how much information consumers can provide during the dialogue are largely shaped by the RA's interface design and its dialogue initiation process. For example, some RAs, such as the RA on MyProductAdvisor's website (www.myproductadvisor.com), ask consumers a broad range of questions from product specifications and brand preferences to acceptable ranges of prices. In using such RAs, consumers are given much room to participate and to inform the RAs of their likes and dislikes related to certain products. Other RAs ask for very little input from consumers and therefore offer little room for consumer participation. For instance, Amazon's website has an RA for recommending books to consumers (www.amazon.com), which simply makes recommendations such as 'Customers who bought this book also bought XYZ'. Are consumers equally satisfied with both types of RAs? Or are they more satisfied with and have greater trust in those RAs that allow active participation? Past research in offline contexts suggests that participation increases consumer satisfaction (Cermak, File, & Prince, 1994) and trust (Ouschan, Sweeney, & Johnson, 2006) and it is worth investigating similar effects in the online context.

Existing research into RAs has offered many insights, although it mainly focuses on two broad research areas. One area studies the effectiveness of computer algorithms, such as content filtering, collaborative filtering, and hybrid filtering, that underlie RAs' recommendations (Ansari, Essegaier, & Kohli, 2000; Ariely, Lynch, & Aparicio, 2004). The other research area examines the impact of using RAs on consumers' search efforts and decision qualities (Häubl & Trifts, 2000; Todd & Benbasat, 1992). Thus, the extant literature on RAs has not examined the relationships between consumer participation, satisfaction, trust, and behavioural intentions. However, understanding such relationships is important given the strategic importance of RAs to marketers. In addition, the important role of consumer participation in successful value co-creation (Auh, Bell, McLeod, & Shih, 2007; Chan, Yim, & Lam, 2010) and the long history of studying consumer participation in offline contexts (Bateson, 1985; Lovelock & Young, 1979) suggest that similar investigations in the online context would yield actionable information for practitioners. Our study intends to fill this research gap by addressing the question of whether and how participation in using RAs influences consumers' satisfaction, trust, and behavioural intentions. A related issue is to determine whether the financial risk (associated with products under consideration) is relevant in the RA context, if it influences consumers' satisfaction, trust, and behavioural intentions, and if it interacts with the effects of consumer participation on satisfaction, trust, and intentions.

Research framework

Effects of participation on satisfaction and trust

In the online context, we define consumer participation in using an RA as the degree to which the consumer is involved in using the RA on its website. For example, participation

in using an RA can include behaviours such as spending time interacting with the RA, responding to questions raised by the RA, and providing the RA with information regarding product specifications, brand preferences, and price range.

Satisfaction has been shown to be a driving force in online purchases and is therefore of critical interest to online marketers (Yoon, 2002). Research in offline contexts has shown consistently that participation enhances satisfaction. Using survey data collected from college faculty, Driscoll (1978) demonstrated the positive effect of participation in decision making on satisfaction. The study showed that the more a faculty member participated in making departmental decisions (such as faculty promotions and salary increases), the greater the faculty member's satisfaction with the decision making process and overall satisfaction with the department. Cermak et al.'s (1994) study found customer participation to have a positive effect on satisfaction in the case of nonprofit organizations as well as legal and financial firms. In a study on customer satisfaction using the critical incident technique, Kellogg, Youngdahl, and Bowen (1997) found satisfaction to be associated with customer participation behaviours such as preparation, active planning, arriving on time, and information exchange. Bitner, Faranda, Hubbert, and Zeithaml (1997) reported that customer participation led to satisfaction with the service provider for different types of health-related services. Dellande, Gilly, and Graham's (2004) study demonstrated that customer participation in terms of complying with the programme requirements of a weight loss clinic led to greater customer satisfaction, both directly and indirectly through the mediating effect of goal attainment. Within the online context, Chang, Chen, and Huang (2009) found that when consumers were allowed to participate in designing their own products on an online T-shirt store, they reported significantly greater satisfaction with the products compared with those consumers who did not have the opportunity to participate. Extending the extant research on participation and satisfaction to the RA context, it is proposed that:

H1: Consumer participation in using an RA will have a positive effect on satisfaction with the RA.

Trust is a salient factor of concern in the online shopping environment (Hoffman, Novak, & Peralta, 1999). This is particularly true when consumers use RAs and other types of decision aids on the Internet (Dabholkar, 2006). The reason is that consumers may wonder whether RAs truly represent their benefits or those of the vendors. Offline research suggests that consumer participation in interactions with service providers increases trust. Sallee and Flaherty (2003) confirmed that salespeople had greater trust in sales managers who empowered them with increased participation and more opportunities for self-management. Ouschan et al. (2006) found that patients had more trust in those physicians who allowed them to participate to a greater extent in patient–physician consultations. Wang and Wart (2007) reported that participation from public citizens, through active involvement in public policies and government operations, had a positive effect on citizens' trust in the administration of the government. Similarly, when consumers are given more room to participate during two-way dialogues with RAs, they will have more opportunities to provide information about their likes or dislikes related to products. As a result, consumers who participate in these dialogues will develop greater trust in the RA because they are likely to believe that their input is not only welcomed but also taken seriously by the RA. In addition, having provided information about their product preferences and interests, consumers may better understand how and why an RA arrives at the recommendations provided to them, which in turn, should build trust in the RA. Thus, it is proposed that:

H2: Consumer participation in using an RA will have a positive effect on trust in the RA.

Effects of satisfaction and trust

Past research into buyer–seller relationships in offline contexts suggests that satisfaction has a positive effect on trust (Garbarino & Johnson, 1999; Johnson & Grayson, 2005). The rationale is that customers' satisfying experiences with a firm become the source of their trusting beliefs about the firm. For example, Selnes (1998) found that the higher a buyer's satisfaction with a supplier, the more the buyer trusted the supplier. Similarly, Román (2003) proposed that customers' satisfying encounters with a service organization should reinforce their trust in the organization and supported this proposition within a financial services context. The effect of satisfaction on trust has been substantiated in online contexts as well. Dabholkar, van Dolen, and de Ruyter (2009) tested a dual-sequence model of business-to-consumer relationship formation within the context of online group chatting and found support for the cognitive as well as the affective route during the relationship formation process. In particular, as regards satisfaction and trust, the authors confirmed that economic and social satisfaction led to greater cognitive and affective trust, respectively. Extending all of these findings to the consumer–RA relational context, it is proposed that:

H3: Satisfaction in an RA will have a positive effect on trust in the RA.

It is worth noting that the literature supports bi-directional links between satisfaction and trust. However, although there is *some* literature support for the effect of trust on satisfaction (Brashear, Boles, Bellenger, & Brooks, 2003; Flaherty & Pappas, 2000; Smith & Barclay, 1997), there is *wider* support for the effect from satisfaction to trust both conceptually (Ganesan, 1994) and empirically (Dabholkar et al., 2009; Garbarino & Johnson, 1999; Johnson & Grayson, 2005; Selnes, 1998). In fact, whereas Dabholkar et al. (2009) proposed and found that satisfaction led to trust in both cognitive and affective sequences, they also tested an alternative model with the cognitive and affective sequences reversed in terms of trust and satisfaction. Their comparison showed that the alternative model (with effects from trust to satisfaction) was poorer than the proposed model, both theoretically and empirically.

Previous research reveals that trust is an important determining factor of consumers' purchase intentions on the Internet. Pavlou (2003) showed that trust in an online retailer was the most influential predictor of consumer intentions to purchase from the retailer. Bart, Shankar, Sultan, and Urban (2005) found that online trust partially mediated the relationship between consumer characteristics and intention to purchase from a website and that this mediation was strongest for websites that offered high involvement, infrequently purchased items. Schlosser, White, and Lloyd (2006) demonstrated through four studies that consumers' trusting beliefs in a firm's ability are the most significant predictor of online purchase intentions when searching for product information on the Internet. The effect of trust on consumers' behavioural intentions has also been examined within the context of using RAs. Wang and Benbasat (2005) found that trust increased consumers' intentions to adopt RAs. Komiak and Benbasat (2006) confirmed that greater trust led to higher intentions by consumers to use RAs as a decision aid for purchase decisions. Given this background, it is proposed that:

H4: Trust in an RA will have a positive effect on intention to purchase based on the RA's recommendations.

Despite the indirect effect of satisfaction on purchase intention through trust as proposed in *H3* and *H4*, there may be a direct effect as well. Satisfaction has been shown to lead to behavioural outcomes such as positive word-of-mouth and repurchase intentions

in many studies within offline contexts. Cermak et al. (1994) showed that satisfaction with financial firms had a positive effect on customers' intentions to increase the size of their trust funds, whereas satisfaction with nonprofit organizations increased donors' intentions to encourage others to set up charitable trusts accounts. Bitner et al. (1997) found that customer satisfaction with the Weight Watchers programme was a strong predictor of intention to continue with the weight loss programme. Even in the online context, Yoon (2002) found that customer satisfaction with shopping websites positively affected intentions to purchase online. Extending this background to the RA context, it is proposed that:

H5: Satisfaction with an RA will have a positive effect on intention to purchase based on the RA's recommendations.

Financial risk

In addition to examining the driving influence of consumer participation, another issue is to determine whether the level of financial risk (associated with products under consideration) is a meaningful determinant of the variables under study. Financial risk should be relevant in the online RA context because past research has shown that searching for and gathering information is used as a risk-reduction strategy by consumers, especially when the purchase carries a high-price tag (Beatty & Smith, 1987; Dowling & Staelin, 1994).

Typically, financial risk tends to reduce purchase intentions (Dodds, Monroe, & Grewal, 1991; Shimp & Bearden, 1982; Teas & Agarwal, 2000; Wong, Tsaur, & Wang, 2009), and it is reasonable to expect that the same effect would be found in the online RA context. Although there is no extant literature on the effect of financial risk on satisfaction or trust, negative effects may be predicted here as well based on the following rationale. When the financial risk involved in a purchase is high, the purchase tends to have greater importance as well as personal relevance to consumers. As a result, consumers will have greater expectations and be more cautious towards the RA that offers product recommendations. The heightened expectations and the extra caution will result in consumers setting higher standards for acceptable outcomes. These higher standards in turn would make it more difficult for RAs to satisfy consumers, to earn their trust, and to make them buy. Therefore, it is proposed that:

H6: In interacting with an RA, the level of financial risk associated with the product under consideration will reduce (a) satisfaction with the RA, (b) trust in the RA, and (c) intention to purchase based on the RA's recommendations.

Although there is no literature on the *moderating effects* of financial risk in a consumer participation context, such effects seem logical in the online RA setting. Specifically, for a product purchase that is relatively low in financial risk (such as a digital camera, priced at $100), a high level of consumer participation in interacting with an RA may be viewed by consumers as unnecessary effort and is therefore unlikely to increase satisfaction, trust, or purchase intentions. In contrast, for a product purchase that is relatively high in financial risk (such as a laptop computer, priced at $1000), greater participation in interacting with an RA might be viewed by consumers as a worthwhile investment of their time and effort and should increase their satisfaction, trust, and purchase intentions related to the RA or its recommendations. As mentioned above, research has confirmed that intensive information search is used as a risk-reduction strategy by consumers for products with greater financial risk (Beatty & Smith, 1987; Dowling & Staelin, 1994). Thus, it is proposed that:

H7: For a high-financial risk product purchase (*vs*. a low financial-risk product purchase), the *effects of consumer participation* on (a) satisfaction with the RA, (b) trust in the RA, and (c) intention to purchase based on the RA's recommendations will be stronger.

In other words, it is proposed that *H7* will moderate the effects proposed earlier in *H1* and *H2*, as well as the indirect effect of consumer participation on purchase intentions (as a result of *H1–H5* taken together).

The conceptual framework as represented by *H1–H6* is depicted in Figure 1. The moderating effect of *H7* is not shown to keep the figure uncluttered.

Methodology

Sample

College students were recruited to participate in this study as they are a representative sample of today's online shopping population (Gefen & Straub, 2003; Wang, Beatty, & Foxx, 2004). According to a recent Pew/Internet research report (Pew/Internet, 2009), the largest share of today's Internet population consists of users aged 18–32 and their dominant online activities are conducting research on products, making purchases, and placing travel reservations. All of these activities can be aided with an RA, making young people and particularly college students a highly relevant population for this study.

A total of 116 undergraduate students with a wide variety of majors (political science, advertising, public relations, psychology, and engineering) from a southeastern US university signed up for the study in exchange for a small amount of extra course credit. The average age of the sample was 21.91, with 54.3% of the participants male and 45.7% female. Almost all the participants (99%) had at least 5 years of Internet experience and 83.6% of them spent at least 1 h on the Internet on a daily basis.

Research design

This study adopted a research design that combines the merits of a controlled lab experiment with those of a field experiment as follows. Existing RAs on actual websites were used to collect data within a controlled computer-lab setting. The rationale for such an approach was two-fold: (1) the level of consumer participation could be carefully controlled and randomization could be realized within a controlled environment, i.e. the computer lab. (2) The study could be more realistic because participants would interact with existing RAs and real websites as they do in their daily lives.

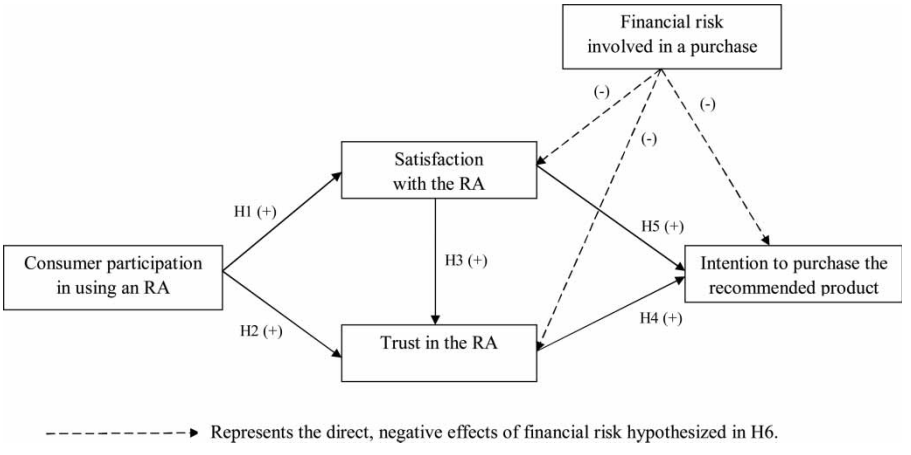

Figure 1. Conceptual framework.

The level of consumer participation was manipulated by using two RAs: one hosted on shopping.com and the other on myproductadvisor.com. Both RAs are 'stand-alone', which means neither works within the websites of retailers such as Amazon or manufacturers such as Dell. This helped avoid possible confounding where a certain retailer's or manufacturer's reputation could have biased consumers' perceptions of the RA. Both RAs function similarly and use content filtering to make product recommendations based on consumers' product preferences. The major difference between them is that they allow different levels of consumer participation. Myproductadvisor.com's RA enables a high level of participation as consumers are asked a wide range of questions regarding their product preferences. Shopping.com's RA, on the other hand, only requires limited input from consumers about their preferences for basic product attributes such as price range and brand.

Financial risk was incorporated in the research design as the second experimental manipulation. Given the literature support for the strong, positive association between price and perceived financial risk (Dodds et al., 1991; Shimp & Bearden, 1982; Teas & Agarwal, 2000; Wong et al., 2009), product type and price were used to create the manipulation of financial risk. For the low-risk condition, participants were asked to search for information and get recommendations for a digital camera priced at $80–120. For the high-risk condition, a laptop computer priced at $1000–1200 was mentioned instead. These two product choices and their predefined price ranges (to represent low *vs*. high levels of financial risk) were based on focus group interviews with undergraduate students who were not part of the main study. A sample scenario used in the 2 × 2 experimental design is provided in Appendix 1.

Procedure

The experiment was conducted in a university computer lab where all computers had the same hardware and software specifications as well as the same Internet connection speed. Due to the lab's capacity constraint, multiple sessions were offered for the participants.

A short, hands-on exercise was held, after all the participants in a session were seated, to familiarize them with online RAs. Next, the scenarios were randomly distributed. The participants were told to read the scenarios carefully and then use the RA on the website specified in the scenario to search for product information and get recommendations for either a digital camera or a laptop computer. After completing the task, each participant filled out a paper-and-pencil survey. The participants were debriefed about the purpose of this research only after all the lab sessions were completed.

Manipulation checks

The manipulation of consumer participation was checked by asking the participants to respond to the statement: 'When using this agent, the number of questions I was asked was . . . ' Responses could range from 1 to 7 where 1 represented 'very minimal' and 7 'quite a lot'.

The manipulation of financial risk was assessed with the statement 'The product that I was trying to get recommendations for was . . .. ' Respondents could choose from a seven-point scale with endpoints 1 representing 'very inexpensive' and 7 'very expensive'.

Measures

Satisfaction with the RA was measured with four items, on a five-point Likert scale from 1 'strongly disagree' to 5 'strongly agree' (see Appendix 2). The first three items shown

under satisfaction in Appendix 2 were adapted from Bechwati and Xia (2003) for measuring satisfaction with the decision aid process. The fourth item was newly developed for this study.

Trust in the RA was measured with seven items, on a five-point Likert scale from 1 'strongly disagree' to 5 'strongly agree'. Wang and Benbasat's (2005) study and Komiak and Benbasat's (2006) study on RAs were used as the basis for developing these items (see Appendix 2).

Intention to purchase based on the RA's recommendations was measured with five items on a five-point Likert scale from 1 'strongly disagree' to 5 'strongly agree'. These items were newly developed for the current study and intended to tap the likelihood that consumers would follow the agent's recommendations and purchase the recommended product (see Appendix 2).

Results

Manipulation checks

Independent-samples *t*-tests were performed on the means of the manipulation checks for consumer participation and for financial risk. The results showed that both manipulations had worked well. The means of the manipulation check for consumer participation were 3.16 (low participation group) and 5.48 (high participation group) ($t = 8.74$, $P < 0.001$). Thus, the participants who used shopping.com's RA indicated a significantly lower level of participation than those who used myproductadvisor.com's RA. Similarly, the means of the manipulation check for financial risk were 3.85 (low financial risk group) and 4.79 (high financial risk group) ($t = 4.72$, $P < 0.001$). Thus, the participants perceived digital cameras as involving significantly less financial risk than laptop computers.

Measure validity

Confirmatory factor analysis (CFA) was conducted to assess measure validity of the three constructs – satisfaction with the RA, trust in the RA, and intention to purchase. All items for these three constructs were included in the measurement model but initial CFA results were not quite acceptable: $\chi^2 = 212.30$, $df = 104$, $\chi^2/df = 2.04$, comparative fit index (CFI) = 0.88, and root mean square error of approximation (RMSEA) = 0.10. An examination of the modification indices revealed that the first satisfaction item (see Appendix 2) cross-loaded onto both trust in the RA and intention to purchase, thus making it a very poor item despite reasonable face validity. After dropping this item from the measurement model, the CFA results showed a good model fit: $\chi^2 = 150.08$, $df = 89$, $\chi^2/df = 1.686$, CFI = 0.928, and RMSEA = 0.077, thus providing support for the convergent validity of the constructs. Convergent validity was further supported by the substantial factor loadings of the items onto their intended constructs, which ranged from 0.67 to 0.91 (see Appendix 2) and were all significant at $P < 0.001$. Cronbach's α was 0.79 for satisfaction with the RA, 0.84 for trust in the RA, and 0.90 for intention to purchase, respectively, all well above the recommended threshold of 0.70 for assessing reliability (Nunnally, 1978).

Correlations among the three constructs were 0.68 between satisfaction and purchase intention, 0.70 between trust and purchase intention, and 0.83 between satisfaction and trust. Given that the correlation between satisfaction and trust was a bit high at 0.83, discriminant validity was assessed between these two constructs using the chi-square difference test. The constrained model where covariance between the two constructs was set to 1 was inferior to the unconstrained model and the chi-square difference was significant,

$\Delta\chi^2 = 29.54$, $\Delta df = 1$, $P < 0.001$, thus supporting discriminant validity between satisfaction with the RA and trust in the RA. Similar tests confirmed discriminant validity between satisfaction and purchase intention and between trust and purchase intention, with $\Delta\chi^2 = 70.72$, $\Delta df = 1$, $P < 0.001$ for the former and $\Delta\chi^2 = 142.22$, $\Delta df = 1$, $P < 0.001$ for the latter.

Hypotheses testing

Independent-samples *t*-tests were performed to test the effect of consumer participation on satisfaction and trust, i.e. *H1* and *H2*. The results showed that consumer participation had a significant effect on satisfaction with the RA ($t = 2.32$, $P < 0.05$). As predicted, participants who used myproductadvisor.com's RA (i.e. the high participation group) reported a significantly higher level of satisfaction with the RA than those who used shopping.com's RA (i.e. the low participation group) with $M_{\text{HighParticipation}} = 4.14$ and $M_{\text{LowParticipation}} = 3.83$. Thus, *H1* was supported. The results also showed that consumer participation had a significant effect on trust ($t = 4.70$, $P < 0.001$). As predicted, participants in the high participation group had significantly greater trust in the RA compared with those in the low participation group, with $M_{\text{HighParticipation}} = 4.10$ and $M_{\text{LowParticipation}} = 3.60$. Therefore, *H2* was also supported.

As an exploratory test, an independent-samples *t*-test was run to look for possible direct effects of consumer participation on purchase intentions. However, the *t*-test was not significant, showing that participation does not affect purchase intentions directly and that its effect, if any, on intentions must be through some mediating factors (as proposed).

Structural equations modelling (SEM) using AMOS 19 was run to simultaneously test *H3–H5*. The model had a good fit: $\chi^2 = 123.25$, $df = 87$, $\chi^2/df = 1.42$, CFI = 0.96, and RMSEA = 0.06. The results provided strong support for *H3*, i.e. the positive effect of satisfaction on trust in the RA, with a standardized β of 0.76 ($t = 6.25$, $P < 0.001$). *H4* was also supported, i.e. the positive effect of trust in the RA on intention to purchase, with a standardized β of 0.50 ($t = 2.16$, $P < 0.05$). The direct positive effect of satisfaction with the RA on intention to purchase, as proposed in *H5*, was not supported at $P < 0.05$, with a standardized β weight of 0.39 ($t = 1.68$, $P = 0.09$). Given the support for *H3* and *H4* but not for *H5*, it appears that the effect of satisfaction on purchase intention is fully mediated by trust.

Independent-samples *t*-tests were run to examine *H6*. The results showed that participants who were asked to search for information and get recommendations for a laptop computer (i.e. the high financial risk group) reported significantly lower satisfaction than those who were asked to search for information and get recommendation for a digital camera (i.e. the low financial risk group), $M_{\text{HighFinancialRisk}} = 3.83$, $M_{\text{LowFinancialRisk}} = 4.17$, $t = 2.59$, $P < 0.05$. Thus, *H6a* was supported. Similarly, compared with those in the low financial risk group, participants in the high financial risk group reported lower trust ($M_{\text{HighFinancialRisk}} = 3.74$ *vs*. $M_{\text{LowFinancialRisk}} = 3.96$, $t = 0.22$, $P = 0.065$). Thus, the means were in the proposed direction, but the *P*-value of 0.065 indicated only borderline support for *H6b*. For purchase intentions, the means were in the proposed direction ($M_{\text{HighFinancialRisk}} = 3.46$ *vs*. $M_{\text{LowFinancialRisk}} = 3.70$, $t = 0.24$, $P = 0.144$), but the difference was not statistically significant. Therefore, *H6c* was not supported.

To test *H7*, the sample was first split into the low and high financial risk conditions (i.e. digital camera *vs*. laptop computer). Next, independent-samples *t*-tests were run for each group to examine the effects of consumer participation under the two financial risk conditions. The results showed that under the *low financial risk condition*, consumer

participation did not have statistically significant effects on satisfaction with the RA, trust in the RA, or intentions to purchase based on the RA's recommendations. The *P*-values were greater than 0.1 in each case. However, under the *high financial risk condition*, participants who used myproductadvisor.com's RA (i.e. the high participation group) reported a significantly higher level of satisfaction with the RA than those who used shopping.com's RA (i.e. the low participation group) with $M_{\text{HighParticipation}} = 4.04$ and $M_{\text{LowParticipation}} = 3.69$, ($t = 2.05$, $P < 0.05$). Similarly, under the high financial risk condition, participants in the high participation group had significantly greater trust in the RA compared with those in the low participation group, with $M_{\text{HighParticipation}} = 4.11$ and $M_{\text{LowParticipation}} = 3.48$, ($t = 4.55$, $P < 0.001$). In addition, under the high financial risk condition, participants in the high participation group had significantly higher purchase intentions based on the RA's recommendations compared with those in the low participation group, with $M_{\text{HighParticipation}} = 4.17$ and $M_{\text{LowParticipation}} = 3.80$, ($t = 1.99$, $P < 0.05$). Thus, comparing the three significant results under the high financial risk condition with the three non-significant results under the low financial risk condition, it is seen that the moderating effects proposed in *H7a–c* are supported.

Discussion

Online product RAs are gaining greater strategic importance for two reasons: (1) RAs provide a possible solution to the Internet fatigue issue for consumers who shop online or simply search for information online; (2) as a critical touch-point between marketers and customers, RAs can help marketers better understand customers through interactions and two-way dialogues. This is the first study to examine how consumer participation in using online RAs affects consumer satisfaction, trust, and purchase intentions. Results from the current research not only extend the extant literature in offline contexts but also provide useful and actionable implications that can guide online marketers.

Theoretical contributions

Findings from this study confirm the important role of consumer participation in using an online RA by substantiating the positive effects of participation on satisfaction with the RA and trust in the RA. These findings are consistent with previous offline research where customer participation was shown to lead to greater satisfaction (e.g. Cermak et al., 1994) and higher trust (e.g. Ouschan et al., 2006), and extend it to the online RA context.

In fact, the notion that consumers actively participate in the process of co-creating value with firms is attracting increasing attention from academia. Consumers' active role as value co-creators has become a focus of recent literature on consumer–firm relationships (Prahalad & Ramaswamy, 2004) and service-dominant logic (Vargo & Lusch, 2004). Based on the strong effects of consumer participation (both direct and indirect) that were found in this study, the current research can be viewed as extending this stream of academic research as well.

An interesting finding of the study is that consumer participation in using an online RA does not directly impact intention to purchase but does so indirectly through satisfaction and trust. In other words, consumer participation *per se* does not translate into greater purchase intentions. Rather it is satisfaction as well as trust generated through consumers' participating in using a RA that determines their purchase intentions. Thus, the current study contributes to the extant research on consumer participation by uncovering the mechanism through which consumer participation influences behavioural intentions.

The finding that trust mediates the effect of satisfaction on intention to purchase is consistent with previous work on the relationships between satisfaction, trust, and behavioural intentions in both offline and online contexts. Garbarino and Johnson (1999) found that for customers with a high relational orientation, such as consistent subscribers of a theater company, trust in the company mediated the impact of customers' satisfaction towards actors, plays, as well as the theater facility on their intentions regarding future attendance and future subscriptions. Johnson and Grayson (2005) reported that a customer's cognitive trust in a financial service advisor mediated the relationship between the customer's satisfaction with his or her previous interactions with this advisor and the customer's anticipation of future interactions with this advisor. In a study on online chatting about travel services, Dabholkar et al. (2009) found that cognitive and affective trust mediated the effects of economic and social satisfaction on behavioural intentions. Our study supports all of this past research and extends it to the context of online RAs. It appears that trust is a factor of greater salience than satisfaction when consumers shop online or simply search for information on the Internet.

Another contribution of the study is the verification that the link from satisfaction to trust is more logical than a link in the other direction. An alternative model, where trust leads to satisfaction, was tested for comparison with the proposed model, as done by Dabholkar et al. (2009). Using SEM with AMOS 19, both models were seen to have equivalent model-fit indices, so at first glance one did not seem superior to the other. However, the results of the alternative model showed that satisfaction had *no effect* on intention, which is not only counterintuitive but contradicts the stream of literature on satisfaction. In contrast, in the proposed model, although satisfaction did not have a *direct effect* on behavioural intentions, it had an *indirect effect* on intentions through trust, which is logical and meaningful and supports the satisfaction literature.

The finding that financial risk involved in a purchase negatively affects consumer satisfaction (and possibly trust) has interesting implications from a theoretical perspective. This finding contributes to the extant research on RAs by identifying financial risk as an inhibiting factor in building consumer satisfaction and trust in an RA. The rationale is that financial risk raises consumer expectations which become harder for the RAs to meet. Thus, despite the fact that RAs are aimed at reducing risks for consumers, it appears that the RAs currently available may be unable to provide consumers with sufficient, high-quality information for making sound product decisions in high-risk purchase situations.

Finally, the moderating effects of high financial risk on the effects of consumer participation show that consumers are unwilling to expend time and effort in interacting with an RA for low-risk purchases, and such efforts on their part do not increase their satisfaction, trust, or purchase intentions. In contrast, faced with a high financial risk purchase, consumers see their participation in interacting with an RA as worthwhile, and as a result, they become more satisfied with the RA, have greater trust in the RA, and form higher intentions to purchase based on the RA's recommendations. It may be noted that moderating effects of financial risk in a consumer participation situation (or, in other words, an interaction effect between financial risk and consumer participation) have not been studied before in any substantive context, and these results represent the first such examination and contribution.

Managerial implications

The finding that consumer participation in using an online RA has positive effects on satisfaction and trust suggests that online RAs need to be designed in ways to allow greater

room for consumers to participate. Letting consumers answer more questions is one way to increase participation in consumers' interactions with an RA. Another possibility is to provide consumers with opportunities to ask the RA questions, which is an active way to engage consumers and increase their participation.

The important role of satisfaction and trust in the link between consumer participation and purchase intention highlights the importance of creating consumer satisfaction and building consumer trust in the context of using RAs. Marketers should identify other sources for generating satisfaction and trust in the use of online RAs. For example, an RA design that is easy to interact with has an appealing approach, and fast response to consumer input could substantially increase satisfaction with the RA.

The finding that the level of financial risk involved in a purchase has a negative impact on satisfaction (and possibly trust) associated with the RA suggests that the positive effects of consumer participation could be dampened by financial risk. Therefore, marketers should develop strategies to offset the negative effects of financial risk in using online RAs. For example, providing consumers with short but convincing explanations about the process by which an RA arrives at certain recommendations and why the recommendations reduce risk for consumers might help alleviate consumers' concerns regarding the validity of the online recommendations about high-risk purchases.

Finally, the moderating effects of financial risk on the effects of consumer participation suggest that designing RAs which require high participation from the consumer would work much better for high-risk product purchases. In contrast, if the online marketer offers mainly low-risk products, an RA that requires less extensive participation from the consumer would be more effective.

Limitations and future research

A possible limitation of the current study is the use of a student sample. Using student participants in marketing research has long been an issue of debate (Ferber, 1977). But it has been widely documented that college students are a strongly representative sample of today's online population (Gefen & Straub, 2003; Pew/Internet, 2009; Wang et al., 2004). This is especially true for the current research context of using online RAs. At the same time, future research could test the proposed research framework using a non-student sample to increase generalizability.

It is likely that an RA's service quality would have a stronger effect on satisfaction and trust than the level of consumer participation in using the RA. Although the current study did not examine the influence of service quality on consumer satisfaction and trust, given the same service quality across different experiences, consumer participation would have the predicted effects on satisfaction and trust, which were confirmed in this study. Future research could incorporate service quality into the theoretical model and test the relative importance of service quality and consumer participation in building satisfaction and trust when using online RAs.

The experimental design used in the study (with consumer participation as a manipulation) precluded a test of possible effects of satisfaction and trust on participation that might occur in practice. For example, greater satisfaction and trust could lead to a higher level of participation in using an RA. Future research could test such effects by using survey research where consumer participation is measured rather than manipulated.

Given that the purchase situation in this study was simulated and based on a projected shopping scenario, the level of financial risk may not have been as palpable as in a real purchase situation. The high-risk aspect could be made even more realistic in future

studies by using a survey approach that captures actual online purchases (with differing risk levels) that were aided by RAs.

Some ways to measure financial risk in future research would be to ask respondents whether the risk of losing money by following the RA's recommendation was low or high, or if using an RA reduced their perceptions of financial risk. Financial risk measured in these ways might be different from financial risk manipulated through product type and price as done in this study and could offer further insights into consumer perceptions of RAs. Future research could also use experimental designs to study whether RAs that allow price comparisons (as opposed to those that do not allow these) reduce consumer perceptions of the financial risk involved in purchase decisions.

This study looked only at financial risk, but future research could study other types of risks that are relevant in using online RAs. For example, it would be interesting to examine the risk of potential choice failure in using RAs given that these online agents are supposed to help consumers avoid poor purchase choices in the first place. Respondents with experience in using RAs could be asked about the extent of risk they perceived in making a wrong choice based on the RA's recommendations. Other relevant risks might be privacy and security risks. Consumers' concerns for privacy and security protection on the Internet have become an issue of increasing importance and are identified as a major obstacle in building consumer trust within the online context (Milne, 2000; Milne & Boza, 1999; Miyazaki & Fernandez, 2001). Future research could provide insights into the extent to which privacy and security risks influence how consumers use online RAs.

Future research could also examine the boundary conditions for the positive impact of consumer participation on satisfaction and trust by investigating potential moderating variables. Some variables such as product knowledge (e.g. expert *vs*. novice) and product type (e.g. search *vs*. experience) have already been studied by researchers (Aggarwal & Vaidyanathan, 2003; Su, Comer, & Lee, 2008) in the online RA context. Product knowledge, product type, and other relevant variables could be investigated with reference to the model in this study to determine possible moderating effects that limit or extend the influence of consumer participation in the use of RAs.

Finally, future research could study the drivers of consumer participation to understand what makes consumers want to participate and what keeps them from wanting to participate. Such factors could range from design features of the online RA to personality variables related to the consumer. For example, Dabholkar (1996) showed that for technology-based self-service, design features such as ease of use, usefulness, and fun were critical in consumers' use of such options and that individual consumer differences such as the need for interaction with service employees often kept people from participating in such options. Future research could investigate how these specific factors as well as other relevant variables might influence the level of consumer participation in using online RAs.

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Appendix 1. Sample scenario

Instructions: Please read the following scenario carefully and fully imagine yourself in this exact situation.

You have been using your laptop computer for almost 4 years. Recently your computer has started running slower and experiencing some technical problems. Worried about losing all your work if the computer breaks down, you have decided to buy a new laptop, priced at $1000–1200. Considering the expense, you decide to carefully look for information and advice on various laptop computers. You remember your friend had mentioned a web site, www.MyProductAdvisor.com, which gives product recommendations for laptop computers. You decide to explore this web site right away.

Instructions: Now with this scenario in mind, please go to the web site of www.MyProductAdvisor.com and use this web site to search and get recommendations for a laptop computer that fits this scenario.

Appendix 2. Confirmatory factor analysis on satisfaction, trust, and intention to purchase

	Factor loadings*	Cronbach's α
Satisfaction with the RA (adapted from Bechwati & Xia, 2003)		0.79
1. I am very pleased with the way the agent searched for product information†	–	
2. I am delighted with the agent's information on laptop computers	0.868	
3. I am disappointed with this agent (R)	0.807	
4. I am satisfied with this agent as a laptop computer expert	0.746	
Trust in the RA (adapted from Komiak & Benbasat, 2006; Wang & Benbasat, 2005)		0.84
1. This agent seems to be very knowledgeable about this product	0.742	
2. This agent seems very capable of asking good questions about my product preferences	0.691	
3. This agent seems to be able to understand my preferences for this product	0.739	
4. This agent does not seem to be a real expert in assessing this product (R)	0.787	

(*Continued*)

Appendix 2. Continued

	Factor loadings*	Cronbach's α
5. I have great confidence about this agent's fairness in giving product recommendations	0.798	
6. I can rely on this agent for my purchase decision	0.794	
7. This agent appears to put my interests ahead of the retailers'	0.785	
Intention to Purchase (Developed for this study)		0.90
1. I would purchase the recommended product	0.859	
2. I do not think I would ever buy this product (R)	0.673	
3. I would definitely follow the recommendation in the near future	0.843	
4. I would most probably purchase the product if I was ever in this situation	0.914	
5. It is very likely that I would buy the recommended product	0.907	

Note: (R), reverse-coded item.
*All item loadings are significant at $P < 0.001$.
†Item dropped due to cross-loadings.