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Assessing the impact of recommender agents on on-line consumer unplanned purchase behavior

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ABSTRACT

Recommendation agents (RAs) have been used by many Internet businesses such as Amazon and Netflix. However, few authors have studied how consumer behavior is affected by those that make suggestions to online consumers based on their recent shopping behavior. Fewer still have examined the role that RAs play in influencing impulse purchasing decisions online. Our study developed a theoretical model to illustrate the impact of RAs on online consumer behavior. The model was tested through an online shopping simulation which used a collaborative filtering based product RA. Particular attention was paid to the effects of an RA on consumer behavior; we found that it increased promotion and product search effectiveness, user satisfaction with the website, and unplanned purchases. Results showed that our model provided insights into the impact of an RA on online consumer behavior and thus provided suggestions for implementing effective systems.

1. Introduction

B2C electronic commerce has become a large and important segment of the new digital economy. Online retailers like Amazon.com and service providers like Netflix.com have come to dominate their market segments online. One of the tools used on the websites of these online powerhouses is the recommendation agent (RA): it provides a customized online shopping experience. Many researchers have speculated that RAs provide an opportunity for online merchants to influence customers' behavior [8,14,24]. Several studies have suggested ways in which RAs may influence online consumer behavior [20,22]. Felfernig and Gula [6] proposed that RAs may persuade the customer that some product attributes are more important than others or make the consumer more satisfied with their online shopping experience.

A complementary stream of research from the marketing literature has examined the process by which consumers shop for and purchase goods and services. Several models describing consumer purchase behavior have emerged over the years. Now that consumers are buying products online via the Internet, researchers and practitioners have become interested in how the technological aspects of online shopping affect consumer behavior. The point at which online shopping, the use of intelligent software agents, and consumer behavior theory come together was thus the primary focus of our study.

Previous studies have provided a theoretical foundation that helps identify online buying process factors important in measuring the RA's impact. While several researchers have identified areas of consumer behavior theory where RAs seem to logically fit into the purchasing process [1], none has attempted to link or examine the impact that RA usage has on the various phases of the consumer buying behavior model. A few studies have examined the impact of intelligent software agents on the product selection and merchant selection processes, but little research has been done in other areas.

One very important area involves assessing how software agents affect consumers during the initial phase of the buying process; i.e., when they realize that they want a particular product. Most of the research deals with the later stages in the purchase process where a consumer is trying to decide which one of the set of alternatives to purchase [7]. Very few studies have examined the role of impulse purchasing, even though such activities have been shown to be a very large component of shopping behavior [19]. Fewer have examined the role of RAs in influencing satisfaction with website and impulse purchasing decisions.

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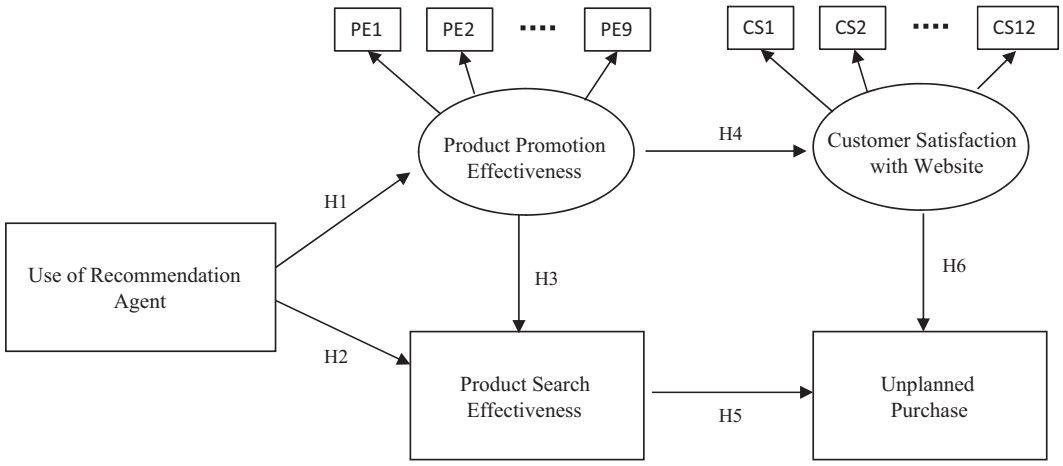

Fig. 1. The theoretical model.

The objective of our research was to test the impact of the use of RAs on online consumer purchase behavior of unplanned purchases on line, as well as consumer affective reaction to product promotion, product search, and satisfaction with the website. If the use of RAs can be shown to produce a significant positive impact on any of these commercially important variables, companies should increase their efforts to use more effective RAs. Moreover, understanding the effects of intelligent web technologies on consumers' online behavior is essential for the success of any web-based businesses.

To accomplish our objectives, we examined the influence of the use of an RA and created a simulated online shopping environment in which some data could be collected to study the impact of the use of RAs in an online retail environment.

2. Theoretical framework

In building our framework, we utilized previous results from consumer behavior theory, impulse purchasing behavior, consumer satisfaction, and agent usage in e-commerce. Fig. 1 shows our model.

Product promotion effectiveness deals with the ability of the RA to recommend products, its ability to attract the participant's attention to the products and develop interest in them. Online retailers may simply promote products and offer special deals to their customers without using an RA. However, general product promotions without some intelligent decision making as to what products the customer may be interested in will be of limited success. He et al. [11] suggested that, "shoppers with similar tastes and preferences are likely to buy similar products". Based on this, using collaborative filtering techniques to recommend a product that one consumer found attractive could be an effective technique for increasing sales. Such techniques are likely to be effective and can have a positive influence on consumer behavior. Therefore, we proposed:

Hypothesis 1. The use of an RA is positively related to product promotion effectiveness.

RAs have transformed the way in which consumers search for product information and make purchase decisions. Since they present lists of recommendations ranked by predicted attractiveness to consumers, customers who use RAs are expected to search through and acquire detailed information on fewer alternatives than those who shop without using RAs, resulting in a smaller search set. Consequently, the use of RAs is expected to increase product search effectiveness. Several studies have shown that the use of RAs reduced the total number of products that participants examined [9,25], and that the use of RAs reduced the number of products about which detailed information was sought. Lastly, Häubl and Murray [10] reported that the presence of an RA reduced search effort measured as the number of alternatives examined. We therefore proposed:

Hypothesis 2. The use of an RA is positively related to product search effectiveness.

After the consumer has been exposed to a product recommendation he or she will respond based on his or her perception of the recommendation. Prior studies have suggested that RAs provide more relevant product information and thus improve customer decision quality [12]. If the customers are seeking information on specific products, the more relevant the information, the better the chance that the customer will find the product attractive. Since the use of an RA signals the availability and status of related products, it can simplify the consumer's shopping by reducing search and decision costs. Through personalized product recommendation, RAs can also help fulfill consumers' need for information and exploration, resulting in improved product search effectiveness. Thus, we proposed:

Hypothesis 3. Product promotion effectiveness is positively related to product search effectiveness.

The outcomes from an appropriate and meaningful product recommendation may vary widely under different circumstances. Consumers may find the product suggestions useful and wish to buy the product, but there may be other constraints that prevent them from doing so. It is also possible that a shopper may simply decide to defer a purchase to a later date. The individual does not actually need to purchase a product to indicate his or her satisfaction with the suggestions and recommendations. On the other hand, whenever customers find the RA product suggestions helpful, it is likely to increase their level of satisfaction with the website. Felfernig and Gula found that participants in their study who used an RA were more satisfied with the decision making process at the website. Thus, we proposed:

Hypothesis 4. RA product promotion effectiveness is positively related to consumers' satisfaction with the merchant's website.

The topic of unplanned purchases or impulse buying has long been considered important by researchers and practitioners. A wide variety of possible factors have been studied. The psychological and shopping environmental determinant factors were addressed by Park and Lennon [18]. Jeffrey and Hodge [13] found