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Online customers' cognitive differences and their impact on the success of recommendation agents

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ABSTRACT

RAs (recommendation agents) have become a major way to assist customers make online purchase decisions. However, do customers consider an RAs' advice to be as important as managers expect? Which customers, if any, use RAs more frequently? Although these questions are crucial to Website management, sparse knowledge of the answers was found. Based on 316 randomly selected customers, we empirically demonstrated that customers' deliberations were not determined by a single cognitive trait, as examined in past IS studies; their decision was more due a function of innovativeness and involvement. More-involved users were found to adopt an RAs' advice. Managerial implications of these findings are discussed.

1. Introduction

Recommendation agents (RAs) are software agents that offer purchase advice to customers who have limited knowledge of B2C e-commerce products and suppliers. Leading Websites have established product-brokering RAs to help customers overcome this challenge and information overload in using B2C Websites [7]. By providing additional advice based on current customers' purchase choices in terms of item-to-item correlation or sequential data patterns [14], RAs play a similar role to that of a salespersons in a retail store [6]. Amazon has an RA to provide customers with advice on books or music that may be of interest to them; saying "Customers also bought *XX* after purchasing this item". Lands' end utilizes an RA to offer customers purchase advice, such as "You might also like…" depending on the specific items they are browsing. These practical cases demonstrate the fact that managers see the RA as a useful system to boost Website sales, entice customers into buying more products, and, eventually, increasing company profits.

However, setting up a successful RA is not straightforward [3] and understanding how customers make decisions based on an RAs' advice is essential: if online customers are unwilling to take the RAs' advice into consideration, the efforts expended in developing RAs could be in vain, or could become too expensive. However, few studies have examined the issue of how customers' cognitive diversity may shape their deliberation of the RAs' advice. In particular, "Do all or some customers deliberate on the RA's advice?" And if yes, "who are these customers?" Answers to these questions, remain under-investigated.

Individual differences in user's cognitive traits, their innovativeness and involvement levels have often been cited as significant for the success of an IS. However, our study was designed to analyze and thus deepen knowledge of user involvement and its impact on system usage by introducing the concept of *situational involvement*. This is the importance that a user attaches to the RA's advice while purchasing on the Website; however, it quickly, disappears when the user leaves the Website. The influence of situational involvement on customers' IS use has been ignored in the past.

The objectives of this study are thus to:

1. Broaden the personalized implications of RAs from a technology to the strategic marketing level.
2. Show that customers' deliberation on RAs' advice is not determined by a single trait but by the interaction of their adaptive-innovative style and involvement level, thus including situational involvement.

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2. Theoretical background and hypothesis development

2.1. The recommendation agent

This provides online customers with advice on products or services that, based on previous or current actions, seem to match the customer's needs, preferences, and interests. Such advice is intended to motivate customers' further purchase desire and help them decide in a self-service e-commerce context [12]. As more and more e-tailing Websites build their own RAs, their acceptance and adoption have attracted researchers and practitioners; e.g., customer trust of RA was studied by Wang and Benbasat [17], who found that positive knowledge-based, interactive, calculative, and dispositional factors resulted in higher trust, while negative calculative and interactive reasons resulted in lower trust. In another study, they found that the use of different types of explanations enhanced trusting beliefs: "how" explanations increased the RA's apparent competence and benevolence, while "why" explanations increased benevolence belief and "when" trade-off explanations increased feelings of integrity [16].

The user interface design is also an important aspect of RA design. Al-Natour et al. [1] investigated two types of perceived similarity (i.e. personality and behavioral) between customers and RAs; their findings indicated that the design of RAs can be used to manifest desired personalities to gain customer preference for a website. Gretzel and Fesenmaier [4] also found that relevance, transparency, duration, and required effort of the elicitation process were important cues of how customers perceived the value of RAs. Investigation of the methods used to develop RAs was another popular issue; Liu and Shin [11] demonstrated an approach combining group decision-making and data mining techniques to: determine the relative weights of RFM variables (recency, frequency, and monetary) in evaluating customer lifetime value; and subsequent development of a rule based data mining approach that provided product recommendations. Xiao and Benbasat [19] conducted an extensive review of RA studies to answer two questions:

- How does RA use, its characteristics, etc. influence customer decision-making and outcomes? and
- What is its effect on users' evaluation of RAs?

2.2. Adaption-innovation theory

Psychologists refer to cognitive style as the manner in which individuals make decisions and solve problems [8]. Individual innovativeness is a cognitive style that has been considered important in social science, psychology, and business, because groups and organizations rely increasingly on the success of new product introductions to stimulate their growth. User's innovations in the IS discipline have been investigated in order to explain individual acceptance of or intention to use systems (e.g. [13]). Individual innovation theory, as developed by Rogers in his Diffusion of Innovations Theory, noted that diffusion of ideas was a complex cognitive process affected by prior adoption and re-use of technology; Kirton's adaption-innovation theory has been applied in IS studies to reveal the relationship between individuals' creativity and behavior (e.g. [2]).

2.3. Personal involvement theory

Individual involvement has played a significant role in customer behavior studies. This trait has been used to explain customers' responses to advertising, products, purchase decisions, brands and technology (e.g. [9]). Apart from product and purchase-decision involvement, enduring and situational involvement have also been widely discussed in the literature as dimensions as delineating the cognitive state of an individual. *Enduring involvement* is the ongoing personal concern with a product, purchase and brand exhibited by an individual. *Situational involvement* is the temporary relationship between a customer's interest and the product/situation, which can be influenced by product attributes (e.g., price, design, and quality) and environmental factors (e.g., promotion, purchase for company use, etc.). It will diminish as the interest is satisfied or as time passes. Thus a customers' involvement in the RA advice at a Website is likely to be situational because the customers' need for RA's support only occurs while they are browsing for a specific item and becoming interested in it; and the need for advice diminishes as soon as the customer leave the Website.

Prior studies have tended to define user involvement as participation in the system development process by representatives of the target user group, but user involvement also includes situational involvement and its effect on information use behavior is sparse.

2.4. Style/involvement model

Building on adaption-innovation theory, studies were made to ascertain whether innovators actually adopted more new methods than others. In studies of computer use, it was found that early innovators included adaptors. In verifying and explaining individuals' innovation adoption behavior, innate innovativeness apparently interacted with interest in product categories, resulting in personal involvement as an explanatory variable that affected why adopters rather than innovators used computers more frequently. This resulted in the style/involvement model (see Fig. 1), which suggested that an individual's problem-solving and decision-making process was shaped by his/her cognitive style and involvement. Consistent empirical findings across studies have shown that this model can effectively explain and predict individuals' use of technological innovation.

As computer usage for different applications can still be perceived as a new venture by many customers due to increased technical complexity and expense, researchers have asserted that computer usage is a suitable product for the investigation of customers' innovation adoption behavior, and a series of studies were conducted to verify style/involvement. The first examined current computer users and their usage. The second investigated current computer users' use-innovativeness in home-computing software applications. The third tested graduate business school students' actual use of home-computing software applications; these students were from three different graduate programs, which make different demands vis-à-vis computer use. Consistently, these studies showed that both innovative cognitive style

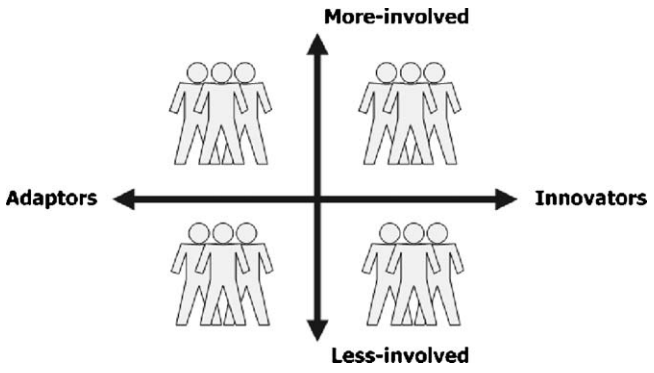

Fig. 1. The style/involvement model.