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# A COMPREHENSIVE MODEL OF CUSTOMER SATISFACTION IN ELECTRONIC COMMERCE: INVESTIGATING THE ASYMMETRIC RELATIONSHIP BETWEEN ATTRIBUTE-LEVEL PERFORMANCE AND OVERALL SATISFACTION

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## Abstract

*From the customer perspective, Business-to-Customer (B2C) is to be defined as a channel. In order to survive, grow, and succeed, IS managers should design B2C channels with attributes that maximize customer satisfaction. The authors investigate B2C channel attributes as antecedents for customer satisfaction. The relationship between the attribute-level performance and overall satisfaction is also investigated; the relationship generally has been conceptualized as linear and symmetric. The authors anticipate the asymmetric and nonlinear impact of attribute-level performance on overall satisfaction.*

**Keywords:** EC channel satisfaction, asymmetric impact, prospect theory, multi-attribute model

## Introduction

Despite the recent burst of the dot-com bubble, companies are still pursuing Electronic Commerce (EC) initiatives. Among the initiatives, B2C is fast emerging as a major player in the relationship between producers and consumers (Devaraj et al. 2002; Alba et al. 1997). These relationships can be described in terms of channels (Chaudhury et al. 2001). Because customer satisfaction is critical for establishing long-term relationships (Patterson et al. 1997) and, consequently, is significant in customer retention (Bhattacharjee 2001), a fundamental understanding of customer satisfaction with the B2C Web sites (i.e., EC channel satisfaction) is of great interest to both researchers and practitioners (McKinney et al. 2002; Wood 2001). Consequently, developing an effective model of EC channel satisfaction has gained importance for both practitioners and researchers.

One of the shortcomings of the extant satisfaction literature is that few studies have been conducted to provide comprehensive understanding of the antecedents of satisfaction, which are able to address the unique differences in shopping behaviors in B2C channel relationships. Moreover, the assumption underlying such studies is that there is a symmetric and linear relationship between the attribute-level performance (i.e., antecedents) and dependent construct such as overall satisfaction and shopping intentions.

A myriad of research questions are related to these issues. What are the key antecedents of satisfaction into which information systems (IS) managers who run such B2C Web sites should invest resources? What if antecedents and satisfaction were linked asymmetrically in the B2C channel? Our current study is intended to provide theoretical and empirical clues to these questions. From a theoretical perspective, we hope to provide a comprehensive framework of the EC channel satisfaction. We also hope

to help IS managers who need to know which variables are related to the bottom line of their success and how these variables can be improved.

## EC Channel Satisfaction and Multi-Attribute Model

Channel satisfaction is an important construct in studying channel relationships because it affects customers' motivation to stay with the channel and it leads to the use of the online channel again (Bhattacharjee 2001; Devaraj et al. 2002). Alba et al. (1997) suggest 5 dimensions and 14 characteristics affecting relative attractiveness to consumers of alternative retail formats. They argue that the B2C channels differ from current retail formats (e.g., supermarket, department store, and catalog) by providing more alternatives and unique features and benefits during various purchasing stages (Alba et al. 1997). However, because the Internet can provide only the visual and auditory senses, the online shopping experience depends heavily on information, technology and system quality to compensate for the lack of physical contact. Also it is not attractive in terms of providing quality information, especially for experience attributes.<sup>1</sup> In fact, combining the EC channel, other online services and conventional catalog, all non-store retailing combined accounts for only 5% to 10% of all retail sales, with little growth in recent years. In order to grow and continue to use the EC channel, customers must believe that the EC channel offers a better choice than current retail formats. Therefore, the EC channel will need to provide customer satisfaction superior to current retail channels.

Since satisfaction is affected by content as well as context (Athanasopoulos 2000), it has been defined numerous ways. For example, satisfaction is described as "an ex post evaluation of consumers' experience" (Anderson 1973), "an evaluation of an emotion" (Hunt 1977, pp. 459-460), and "a pleasurable fulfillment" (Oliver 1997). Antecedents of satisfaction in explanatory models also vary with regards to characteristics of the retail channel format (Patterson et al. 1997). Therefore, the EC channel satisfaction needs to be uniquely defined (Hoffman et al 1999). Antecedents of the EC channel satisfaction also need to be distinctively investigated (Kiang et al 2000).

Although IS researchers (e.g., Bailey and Pearson 1983; Doll and Torkzadeh 1988; DeLone and McLean 1992; Kettinger and Lee 1994; Seddon 1997; Bhattacharjee 2001; McKinney et al. 2002) have used the satisfaction construct in measuring IS success and use, little research has made an explicit distinction between IS satisfaction and channel system satisfaction (for an example, see Devaraj et al. 2002). Marketing researchers like Bucklin (1972) argue that channel systems exist and remain viable by performing duties and providing benefits to customers. Satisfaction of channel systems is affected by almost all factors through all purchasing stages; (a) need arousal, (b) information search, (c) alternative evaluation, (d) purchase decision, and (e) post-purchase evaluation (Kotler 1997). Toward this objective, we examine channel satisfaction based on an integrated analysis using a multi-attribute model in which EC channel satisfaction is defined as an overall customer assessment of satisfaction affected by multiple attributes such as ease of navigation (Wolfenbarger and Gilly 2001), user-friendly interface (Lohse and Spiller 1998), enjoyment (Liu and Arnett 2000), and service quality (Barnes and Vidgen 2001).

There are several benefits, theoretically and managerially, to using multi-attribute models in the context of EC channel satisfaction. First, customers are more likely to render their post-purchase evaluation at an attribute level rather than at the product level (Gardial et al. 1994). Second, an attribute-level approach to the satisfaction instrument can be used as a higher level benchmarking tool as well as a diagnostic or prescriptive tool for IS professionals compared with the "overall" approach (LaTour and Peat 1979). Third an attribute-based approach enables researchers to solve typical dilemmas that IS managers face, where consistently increasing Web site emphasis on aesthetics (one attribute) do not yield corresponding changes in overall satisfaction ratings, where increasing Web site performances on five attributes out of six (only one attribute performance is down) yield decreasingly declines in overall satisfaction, and where customers experiencing mixed feelings that do not choose a Web site that provide highest performance on five attribute out of six (Olshavsky, 1985). Thus a multi-attribute model can help extend both conceptual and empirical understanding of the commonly observed phenomena.

Based on the analysis, we propose that

**Proposition 1:** Using a multi-attribute model for the EC channel satisfaction construct results in the model's ability to better explain variance in customers' behaviors in the EC channel.

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<sup>1</sup>Based on Nelson's (1974) distinction, search attributes can be gained from secondhand sources without having to buy or trial, such as price, size, and appearance. In contrast, experience attributes can be verified only by use of the product

## Satisfaction Models and Asymmetric Effect

There are several research paradigms of customer satisfaction offered in the marketing research stream: expectancy disconfirmation (Oliver 1980; Churchill and Surprenant 1982), norms (Woodruff et al. 1983), attribution (Richins 1983), equity/inequity (Bagozzi 1975) and satisfaction or dissatisfaction (Patterson et al. 1997). Recently in the EC context, IS researchers (Bhattacharjee 2001; McKinney et al. 2002) have adopted the expectancy disconfirmation paradigm to investigate key determinants of EC customer satisfaction. Bhattacharjee (2001) provides a conceptual model, which supports the causal relationship between satisfaction and IS continuance (i.e., the intention to continue using IS), while using two antecedents, ‘perceived usefulness’ from the technology acceptance model (Davis et al., 1989) and ‘disconfirmation’ from Oliver’s (1980) expectancy disconfirmation paradigm. By synthesizing the expectancy disconfirmation paradigm with empirical theories in customer satisfaction, another model (McKinney et al. 2002) separates Web site quality into information quality (IQ) and system quality (SQ) while using the salient attributes of Web-IQ and Web-SQ as the basis for formulating the first-order factors.

The assumption underlying such models is that there is a symmetric and linear relationship between attribute-level performance and overall satisfaction. Although researchers (e.g., Anderson and Sullivan 1993; Oliva et al 1995; Mittal et al. 1998) recognize that the overall satisfaction function may not be linear and/or symmetric, no research in IS fields suggests a satisfaction model, which investigates the asymmetric impact of negative and positive attribute level performance/negative and positive disconfirmation on overall satisfaction. One unit of negative performance on an attribute could have a greater effect on overall satisfaction than a corresponding unit of positive performance. Similarly in a given set of attributes, negative disconfirmation on a single attribute could outweigh positive performance on many other attributes combined. One theoretical reasoning supporting the above argument is based on the prospect theory (Kahneman and Tversky, 1979). Contrasted to economic theories, the prospect theory perceives value attuned to the evaluation of changes or differences rather than to the evaluation of absolute magnitudes. As depicted in Figure 1, prospect theory postulates that the value function (1) is defined on deviations from the reference point (reference dependence), (2) is generally concave for gains and commonly convex for losses and steeper for losses than for gains (loss aversion), and (3) has a marginal value of both gains and losses that decreases with their size (diminishing sensitivity).

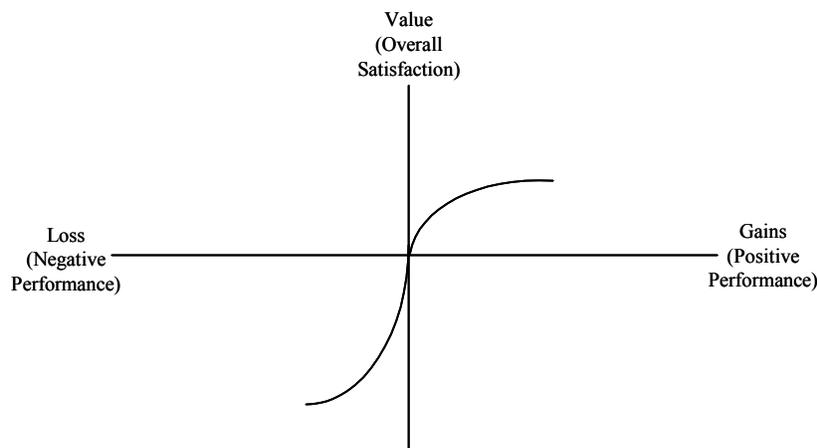


Figure 1. Asymmetric Impact of Attribute-Level Performance

The loss aversion built into prospect theory suggests that negative outcomes on attribute performance should carry more weight in the overall EC channel satisfaction. For example, if a Web site’s processing time (idle time) were to be increased by 10 seconds per search (negative performance), it would have a greater impact on EC channel satisfaction than if the Web site’s process time of search engine were to be decreased by 10 seconds per search (positive performance). In addition, overall satisfaction also should display diminishing sensitivity toward attribute performance. For example, adding a 10<sup>th</sup> search option (adding positive performance at high level performance) should not affect the EC channel satisfaction as dramatically as adding a second search option (adding positive performance at lower levels of performance). Therefore, we propose that:

**H1:** Negative performance on an attribute will have a greater impact on EC channel satisfaction than the positive performance on the same attribute.

**H2:** Negative disconfirmation on an attribute will have a greater impact on EC channel satisfaction than the positive disconfirmation on the same attribute.

**H3:** EC channel satisfaction will display diminishing sensitivity to changes in the magnitude of performance for a given attribute.

## Vertical View of Satisfaction and Memory Based Processing

Researchers distinguish between transaction-based and cumulative satisfaction. In EC channel context, IS managers should be interested more in the customers' accumulated satisfaction over many samples (occurrences), i.e., the vertical view of satisfaction (Oliver 1997). Shopping at a favorite Web site repeatedly might be an example of this phenomenon. Accumulated satisfaction (sometimes referred to as long-term or summary satisfaction) is linked to memory based processing. Memory accessibility is a function of stimulus salience such as frequency, recency and personal relevance, among other things (Taylor 1982). Evidence shows that negative information is more perceptually salient than positive information (Peeters and Czapinski 1990).

Similar psychological operations should occur for EC channel satisfaction because it is linked to memory-based processing (Yi 1980). To the extent that attributes with negative performance will be more perceptually salient than attributes with positive performance, attributes with negative performance should have a greater impact on the cumulative satisfaction judgment. Thus, within a given set of attributes, the relative impact of each attribute will be asymmetric. Consequently, when combined, attributes with negative performance should have a greater impact on EC channel satisfaction than their corresponding attributes with positive performance combined. Along similar lines, a diminishing sensitivity hypothesis between EC channel satisfaction and performance on various attributes can be proposed. For example, adding 10 search options should not affect EC channel satisfaction as dramatically as ten times of adding one search option. On the basis of the previous discussion, we hypothesize that

**H4:** Cumulatively, attributes with negative performance will have a greater impact on EC channel satisfaction than attributes with positive performance.

**H5:** EC channel satisfaction will display diminishing sensitivity to additional instances of negative or positive performance.

## Research Design

To develop a comprehensive list of antecedents of EC channel satisfaction, we will follow the next four steps:

1. Conduct open-ended interviews with consumers experienced in an EC channel aimed at identifying (1) the most important attribute and measuring (2) their overall satisfaction (operationalized as a seven-point scale) with the EC channel.
2. Generate categories for the antecedent of EC channel satisfaction using a literature review and coded data from interview 1.
3. Rank the categories using frequency by coding each category as 1 if a respondent gave a response in that category and 0 otherwise.
4. Conduct a mail survey assessing measures of satisfaction and disconfirmation.

To test H1, a dummy-variable regression will be conducted using all of the categories as independent variables and overall satisfaction as the dependent variable. To test H2, a dummy-variable regression will be conducted. The specific equation that will be estimated is  $[\text{Overall Satisfaction} = \text{Intercept} + \sum B_{1i} + \sum B_{2i}]$  where  $B_{1i}$  represents the relative impact of positive disconfirmation on attribute  $i$ , whereas  $B_{2i}$  represents the relative impact of negative disconfirmation on the same attribute on overall satisfaction. To test H3, a correlation coefficient analysis between attribute level performance and channel satisfaction that based on the natural logarithm will be conducted (Anderson and Sullivan 1993). To test H4 and H5, the following equation is estimated:  $[\text{Overall Satisfaction} = b1(\text{POSITIVE}) + b2(\text{POSITIVE})^2 + b3(\text{NEGATIVE}) + b4(\text{NEGATIVE})^2]$  where POSITIVE and NEGATIVE are the sums of positively and negatively tokens of attributes, respectively. To test for diminishing sensitivity, the squared terms are introduced (Hamilton 1992).

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