

## **Returning Internet Purchased Color Sensitive Products: The Effect on the Supply Chain**

### **ABSTRACT**

To date, research performed regarding the effects of product returns due to color from web purchases is scant at best. It is apparent, however, that as the number of Internet purchases increases, the return of goods is also significantly increasing. The return of these goods affects the supply chain in many ways. The increase in return goods has substantial costs to a company. This work looks at the effect color has on product returns. In this paper, we hypothesize that one major reason for returns is the color differential between the on-line product and the actual product received. This research will be conducted multiple phases. Phase 1 has been conducted and preliminary findings from customer surveys are discussed in this paper. Phase 2 and phase 3 research efforts will be discussed.

### **INTRODUCTION**

Companies are selling their products (goods, and services) over the web at an ever-increasing rate. Internet sales of non-travel related products have reached \$988 million a week, with apparel and home items experiencing a greater increase than other items (Purente, 2002). The companies selling on the web are sometimes referred to as "Click" and normal outlets are referred to as "Brick and mortar". Therefore, companies now using both the brick and mortar and click approach are often referred to as "Brick and Click". Whether a company is click or brick and click, the rate of returns from the customer has increased from the use of the click side of the business. Industry research has shown that while color is a critical factor in the selection of fashion products, customers have come to distrust color accuracy on the web (Businesswire.com, 1999). Although 76% of web users shopping for color related items indicate that color accuracy is an important characteristic, 60% of the users do not trust the item color as displayed in the product image (Businesswire.com, 1999). Also 15% of color-critical items are returned (Businesswire.com, 1999). This is especially true for those who shop for clothing and accessories, since color is often a critical factor in the selection of such items. It is estimated that as high as 40 to 50% of items ordered over the Internet are returned (Bunn, 1999). Reverse logistics, the movement of goods from the consumer as far as back to the store or the manufacturer, has increased substantially.

Reverse logistics now costs the nation approximately 5% of overall logistics costs (Bunn, 1999). Industry recognized the ramifications of reverse logistics much sooner than the academic world. Most reverse logistics issues are appearing in practitioner-related journals rather than academic journals (Carter and Ellram, 1998). Industry has even started to recognize that proper administration of reverse logistics can be a strategic advantage in the supply chain (Schwartz, 2000). The supply chain can be defined as "the network of entities through which material flows. Those entities may include suppliers, carriers, manufacturing sites, distribution centers, retailers, and customers" (Lummus and Alber, 1997). Reverse logistics has even become one of the more important issues in

warehouse management (Brockmann, 1999). Yet, logistics managers within many companies do not handle reverse logistics well (Meyer, 1999).

In summary, reverse logistics is becoming very important for many companies who are trying to compete in the e-commerce market. However, finding time to do reverse logistics can be difficult if the systems are not effective and efficient (Stock, 2001). Therefore, any reduction in reverse logistics costs provides more profit to their bottom line.

One of the authors assisted in decision making for the implementation of a return goods program for a large U.S. logistics company. One high-ranking executive officer in charge of logistics operations in the company stated that customers who returned goods due to color dissatisfaction indicated that color misrepresentation on monitors contributed significantly to their returns of products purchased over the web. He believed that color variation between what was anticipated and the actual product received contributed to a large number of returns. Therefore, this work focuses on verifying whether high consumer return rates could be attributed to color representation errors on the web.

### RESEARCH APPROACH

The investigation into the effect of inaccurate color on returns of products purchased over the Internet has been divided into phases. The first phase of the research effort has been completed. Its purpose was to determine the general effects that color has on consumer behavior. The second phase, not yet administered, will investigate the error rate between actual color and the color representation on the web, and the effect this has on the number of items that are returned. Phase 3 will involve e-tailer and manufacturer awareness of findings from phase 2. Note that each phase affects different aspects of the supply chain (figure 1). This figure shows the segments of the basic e-commerce supply chain that serve as the focus of each research phase.

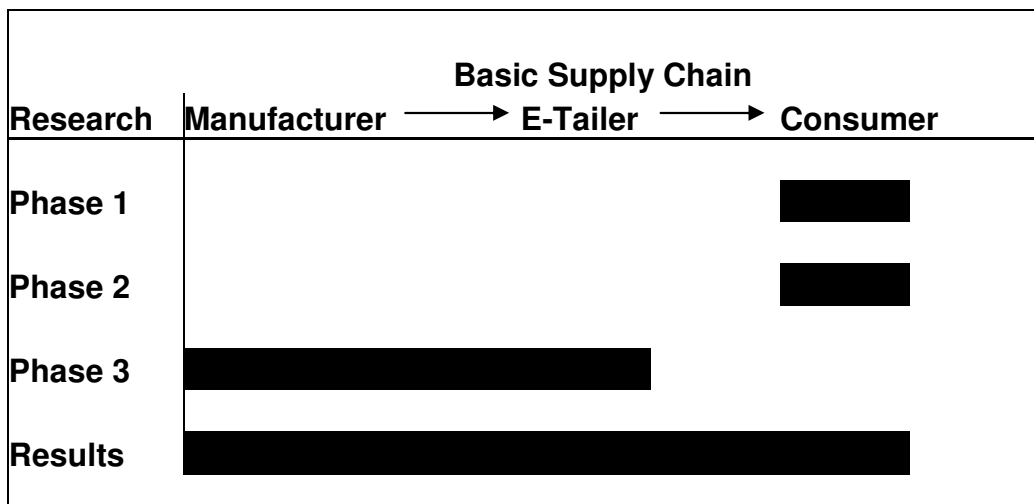


Figure 1 - Research involvement in the supply chain from phase to phase

## **Phase 1 Methodology**

This phase involved a survey structured to investigate consumer behavior with respect to e-commerce. The data collection process involved the design of a questionnaire. The questionnaire was structured to provide information about behavior, purchase intention, complaint behavior and product return behavior.

The questionnaire was administered to university students because of the availability of a large number of subjects who represent a cross section of both experienced and inexperienced Internet shoppers. It is critical to involve experienced users since their familiarity provides them with a more realistic perspective of Internet shopping than inexperienced users. Other research dealing with fashion marketing on the web has used a similar sample (Griffith, et al., 2001). Three hundred questionnaires were collected from the students who participated in this study.

## **Phase 1 Results**

Overall, 14.8% of respondents indicated that they have had personal experience with inaccurate color on-line. Some 78.3% of our respondents have purchased on-line within the year preceding the research point. For those who purchased on-line, the number of purchases ranged from 1 to 60, with the median number of purchases being four. Most of the respondents (61%) indicated that they made between one and eight purchases, while 19% of the respondents indicated that they made ten or more purchases during the last year.

Among those who purchased in the last year, 12.1% complained to the on-line merchants if an item delivered did not adequately match the on-line image, and 10.9% returned an item that was delivered in a color different from what was expected. Over a third of those who complained also returned the item in question. Of those who complained, only 41.9% indicated that they would continue to purchase from a merchant even if they had a color problem.

In summary, this academic study seems to corroborate industry studies that indicate that a substantial color inaccuracy problem does exist and does impact on-line purchasing behavior. When on-line customers are conditioned to distrust what they see on e-commerce sites, they may make complaints about unsatisfactory items, return those items, or even stop making on-line purchases altogether. It is the 10.9% who return items because of color inaccuracies that is especially significant to reverse logistics. The full effect of this problem needs to be investigated further and the nature of the problem validated. This study was an initial investigation into the pre- and post-sale ramifications of inaccurate color representation on the Internet. Phase 2 is designed to analyze the color discrepancy between actual swatches of cloth in differing colors and images of those swatches on a monitor. The following sections address this phase of the research effort.

## Phase 2 Methodology

The data collection process involved two steps. First, a series of e-mail messages and telephone interviews were utilized to establish if industry leaders agree that the problem of inaccurate color representation on the web actually exists. The information gathered in this phase of the study confirmed that a problem exists but that only some Internet marketers are aware of it. In addition, industry feedback provided a partial basis for the questionnaire used in this research project.

The research question that prompted this research effort will be addressed in this phase. This phase will investigate potential errors between actual swatches of cloth, each with different solid colors, and their representation on a monitor. Once again, consumer surveys similar to those used in phase 1 will examine whether there is a significantly larger proportion of returns for color-critical items, e.g. fabric items, ordered via e-commerce. This phase will involve the research model shown in figure 2.

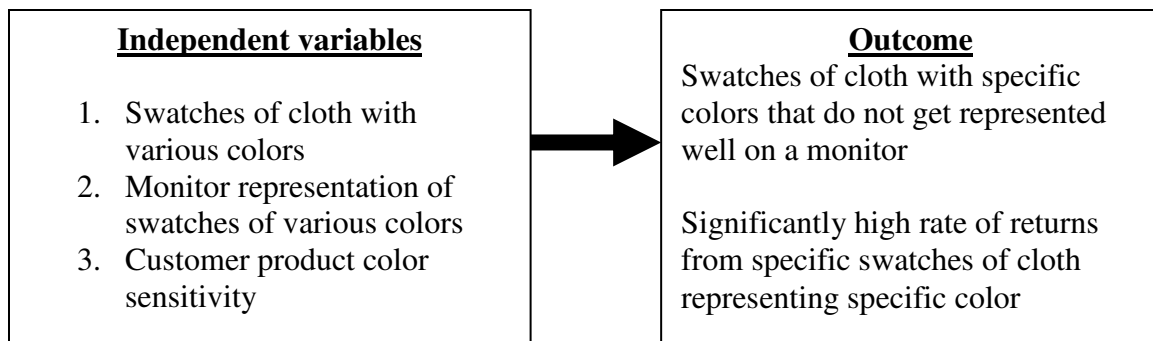


Figure 2 – Phase 2 Research Model

Survey data gathered will be analyzed to determine if there is significant correlation between actual swatches of various solid colors and their representation on a monitor, along with the effect of customer product color sensitivity (see figure 1). Once again, if a high rate of returns can be tied to color inaccuracies there will be important reverse logistics implications. This information will provide a basis for continuing to phase 3.

## Phase 3 Methodology

E-tailers and manufacturers will be polled via survey methodology to determine their awareness of various color discrepancies found in phase 2. These companies will be asked to report if they perceive that they have product with color sensitivity for sale over the web. The actual color of this product will be sought. The company will be asked to rate returns based on differing colors. Then, with the knowledge gained in phase 2, a correlation of what the companies think and what has been discovered will be analyzed, and reverse logistics implications will be assessed.

## SUMMARY AND DISCUSSION

Conversations with Internet marketers during the initial stages of this undertaking revealed that many think a vast majority of consumers are not concerned with color accuracy when considering making purchases from an e-commerce site. Phase 1 of our study indicates that they have a false sense of security, because 65% of those surveyed indicated that they would not purchase clothing if the color were in doubt. Furthermore, 87% of the respondents indicated that they would return clothing due to color inaccuracies, and 10.9% had actually returned an item with an unsatisfactory color within the preceding year. Such levels of returns lead to high reverse logistics costs.

Once all phases have been conducted, analysis will be performed to determine if better understanding of colors that are associated with such high returns can reduce the volume of returned goods. Color correction software that currently exists can be studied to determine if any packages adequately correct for the problematic colors found in phase 2. This information can be reported with better certainty so that a company can correct its color-related problems and thereby reduce reverse logistics costs within a company.

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