Modeling Consumer Behavior in On-line Environments

Project Team:

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Goal Statement:
The goal of this project was to develop and apply a model to explain and predict consumers' use of the Internet for product search and purchase behaviors based on a synthesis of utility maximization theory and consumer adoption theory that considers motivations (perceived advantage or benefits) derived from online search/purchase and costs (in terms of physical and/or psychological effort) associated with online search/purchase. In year three, we examined the effectiveness of the Internet in enhancing product awareness, evaluations and purchase intentions by determining the impact of selected website characteristics on participants’ (a) product evaluations and (b) purchase intentions.

Objectives of research project were:
1) To develop a valid and reliable measure of motivations and costs associated with online information search and purchase behavior;
2) To test the validity of the measure to identify the impact that specific motivations and costs have on apparel search and purchase decisions among Internet shoppers worldwide;
3) To evaluate the potential of the Internet as an efficient and effective medium to disseminate information to enhance brand/product awareness, evaluations, and purchase intentions

Abstract:
The goal of year three was to evaluate the potential of the Internet as an efficient and effective medium to enhance brand/product awareness, evaluations, and purchase intentions (objective 3). Initial findings from the first national sample (year 1) showed that the developed scales have good reliability and construct validity and demonstrated the model's effectiveness in explaining and predicting information search and purchase behavior in online environments (Forsythe, Petee, & Kim, 2002). The findings of scale validation, based on the second national sample (year 2), revealed that both scales (for perceived benefits and for perceived risks) are relatively stable across independent samples and over time. The current findings provide important insights about the impact of selected website characteristics on consumers’ product evaluations and online purchase intentions and have important implications for US apparel marketers.

Introduction:
The Internet is revolutionizing the way consumers learn about, evaluate and purchase products as e-commerce technologies provide a new platform for communication of product and brand information. However, the US textile and apparel industry has failed to take full advantage of the unique capabilities of the Internet to effectively market their products. Given that apparel products represent one of the fastest growing and most popular online product categories (Ryan, 2003), the potential of the Internet as a marketing medium for apparel products is considerable. To effectively impact product/brand evaluations and purchase intentions, it is essential to understand consumers’ motivation to use the Internet to search for product information and/or purchase products and the factors that inhibit online purchases. Empirical research on shopping in traditional retail environments has shown that "consumers select retail outlets that meet their expectations on dominant shopping motives" (cf. Gerht & shim, 1998; Teo, Lim & Lai, 1998). Consumers’ shopping motives may similarly impact shopping behaviors on the Internet; however, there is little evidence to indicate how perceived costs (or a combination of motives and costs) may impact consumers’ use of the Internet for product search and purchase activities. To address these deficiencies, we developed and tested a consumer behavior model that simultaneously examines both motivations (perceived benefits) and costs (hindrances) associated with online search and purchase behaviors.

The model developed in this research was based on the utility maximization framework of consumer decision-making (the dominant theoretical paradigm in the study of discrete choice, where consumers make value tradeoffs to maximize perceived utility), consumer adoption theory (where consumers maximize perceived utility based on minimized effort input), and on the broadly understood and applied theory of shopping motivation (Li, Kuo & Russell, 1999; Forsythe & Chun, 2000). Although numerous conceptual frameworks have been used to examine the motivational determinants of shopping behaviors in traditional contexts, these concepts have not been extended
to online shopping environments. The conceptual model proposed here (based on these frameworks) was tested to
determine its effectiveness in explaining and predicting information search and purchase behavior in online
environments. Preliminary work with the model (Forsythe & Shi, 2000) suggests that it is necessary to understand the
relative contribution of both motivations and costs to explain and predict consumer’s online search for product
information and ultimately, purchase behavior.

Approach:

First, it was necessary to develop valid and reliable scales (that have robust psychometric properties) to
identify and measure motivations and costs associated with searching and purchasing online. The goal of year one,
to develop a valid and reliable measure of motivations associated with purchasing (or not purchasing) apparel
products online (objective 1), was successfully completed. The initial instrument was pre-tested with promising
results using psychometric techniques to verify reliability and validity (Forsythe, Petee and Kim, 2002). Second, it
is critical to provide evidence of scale validation.

The purpose of scale validation is fourfold. First, it is important to replicate the confirmatory factor
structure on an independent sample, thereby reducing error due to capitalization on chance (MacCallum, Roznowski
& Necowitz, 1992) and demonstrating the extent to which the measurement model is stable across independent
samples. Second, the shopping motivation constructs are then correlated with theoretically related constructs to
establish evidence of nomological validity. Third, to assure usefulness, the scale must have predictive validity.
Fourth, comparison of the results with independent parallel research is important to establish additional evidence of
validity and practical utility.

Scale validation activities were accomplished in a systematic and rigorous way using recommended
psychometric techniques. A web-based survey containing 16 perceived benefit items and 12 perceived risk items
was constructed after strict modifications based on results from the first national sample. Variables used for
nomological and predictive validity tests, demographics and Internet usage were also included in the survey. Target
respondents were a cross-section of Internet shoppers, including both online visitors and purchasers. Following a
successful pre-test with a university student sample, the research instrument was administered online to a national
sample of 1500 Internet users using a stratified sampling procedure. Panel members were sent an invitation through
email with a hyperlink to the URL of the online survey. A total of 789 responses were received, representing a
response rate of 52.6 %, an excellent response rate. After data cleaning and response verification, 598 complete and
valid responses were included for data analysis. The results of scale validation based on the second national sample
are summarized below.

Factor Structure Stability

To assess the factorial stability of the perceived benefits scale, both national samples (year 1 and year 2)
were combined using a multi-group analysis procedure that allows for the independent estimation of factor loadings,
factor correlations, and error variances on the two samples (Byrne, 2001). The goodness-of-fit indexes bearing on
this multi-group model are reported as: Chi-square = 1097.99, df = 196, GFI = .914, RMSEA = .055. As noted, the indexes indicated that the hypothesized four-factor model of perceived benefits demonstrated a
good fit across the two independent panels of online shoppers (Figure 1).

Having established the fit of this model, we then tested for invariance of factorial measurement and
structure across the two independent groups. In structural equation modeling, testing for the invariance of
parameters across groups is accomplished by placing constraints on particular parameters. We first set constraints of
invariance for (a) all factor loadings, (b) all factor variances, and (c) all factor covariance. Goodness-of-fit statistics
related to this constrained two-group model are: Chi-square = 1245.35, df = 217, GFI = .906, and RMSEA = .056. A comparison of the Chi-square of the constrained model with that for the initial model in
which no invariance constraints were imposed yields a Chi-square difference value of 147.36 with 21 degrees of
freedom, which is statistically significant at the .05 probability level. We noticed that some equality constraints do
not hold across the two groups. Subsequent tests for invariance were conducted to pinpoint the location of this
variance. When compared to the base-line model (Chi-square = 1097.99); successive models showed no significant
change in Chi-square, that is, they had equal factor variances (Chi-square = 1103.71) and covariance (Chi-square =
1107.9). However, there was a significant difference in factor loadings (Chi-square = 1133.263) between two
groups. In order to find the nonequivalent factor loadings, we tested for invariance relative to each factor separately.
A series of tests revealed that factor loadings for “shopping convenience”, “ease of shopping”, and
“hedonic/enjoyment” are equivalent across the two samples, thereby signaling some discrepancy in the factor
loadings for “product selection”. The subsequent test revealed that only the factor loading associated with item “can
get good product information online” to be group-invariant. The above results provided good evidence of the factorial stability of the developed scale of perceived benefits across independent samples and over time.

The same procedure was applied to assess the factorial stability of the measurement model for perceived risks. The goodness-of-fit indexes for this multi-group model are reported as: Chi-square = 640.38, df = 116, Chi-square/df = 5.52, GFI = .935, RMSEA = .054. As noted, the indexes indicated that the hypothesized three-factor model of perceived risk fits well across the two independent samples of online shoppers (Figure 2). Having established the fit of this model, we then tested for invariance of factorial measurement and structure across the two independent samples. When compared to the baseline model (Chi-square = 541.01), successive models showed a significant change in chi-square: variant factor loadings (Chi-square = 579.93), variant factor correlations (Chi-square = 550.23) and variant factor variance (Chi-square = 550.78). Only the error covariance was equal (Chi-square = 541.27). Further tests to check the nonequivalent factor loadings revealed that factor loadings on “time risk” are invariant across two independent samples. However, factor loadings on the other two factors were variant across the two independent samples. Therefore, we did not have evidence of the factorial stability for all dimensions of the perceived risk scale across the independent two samples, suggesting the developed instrument of perceived risks works somewhat differently for the two samples. This difference may result from (a) the difference between the two samples (respondents in the second sample had high Internet skill) or (b) the evolution of Internet shopping (due to technological advances to simplify online shopping). Either of these factors could alter the way perceived risks impact online shopping behaviors.

Unidimensionality, reliability and convergent validity

Given that goodness-of-fit indexes for the multi-group model were good for both measurement models (perceived benefits and perceived risks), we have evidence that the measures are unidimensional, with each item reflecting one and only one underlying construct. As illustrated in Table 1, coefficient alpha estimates, ranged from .65 to .90 for the measure of perceived benefits and from .72 to .84 for the measure of perceived risks. Therefore, reliability of the subscales for each dimension of perceived benefits and perceived risks is acceptable as all coefficient alpha estimates are above the acceptable threshold (Nunnally & Bernstein, 1994). Convergent validity is illustrated in that all confirmatory factor loadings are relatively high, and are significant.

Nomological validity

Beyond assessing the latent structure, internal consistency, and construct validity, scale validity must be tested. The importance of establishing nomological validity has been well documented (e.g., Babin, Darden, & Griffin, 1994). Nomological validity may be established by the correlations of scale responses with other relevant measures. Literature indicates that Internet shoppers who perceive more benefits from online shopping will be more likely to shop online than those who perceive few benefits (Rohm & Swaminathan, in press; Childers, Carrubba, Peck & Carson, 2001). Conversely, shoppers who perceive more risks associated with online shopping will be deterred from shopping online. Consequently, the seven online shopping motivation constructs were investigated by two domains (perceived benefits and perceived risks) within a nomological network of rationally related constructs, including frequency of online shopping, amount spent online, and specific online shopping patterns. Hypotheses were developed and the correlation between the seven shopping motivations and (a) shopping frequency and (b) amount spent online were assessed to test the hypotheses, and hence, to establish nomological validity of the developed scale.

H1a: The four positive shopping motivations will have significant positive correlations with frequency of online visiting.

H1b: The four positive shopping motivations will have significant positive correlations with frequency of online purchasing.

H1c: The four positive shopping motivations will have significant positive correlations with amount spent online.

H1d: The four positive shopping motivations will have significant positive correlations with amount of time spent shopping online.

H2a: Time risk will have a significant negative correlation with frequency of online visiting (the other two dimensions of perceived risk were not expected to have a significant correlation with frequency of online visiting because no financial or product risk is associated with online visiting.)

H2b: The three negative shopping motivations will have significant negative correlations with frequency of online purchasing.
H2c: The three negative shopping motivations will have significant negative correlations with amount spent online.

H2d: The three negative shopping motivations will have significant negative correlations with time spent on Internet shopping.

The correlations between the four dimensions of perceived benefits and frequency of online visiting, online purchasing, amount spent online, and weekly hours spent Internet shopping are all significant (p<.05) with the exception of one relationship -- amount spent and enjoyment. Therefore, H1a, H1b, H1d were fully supported and H1c was partially supported (three of the four positive motivations were significant as hypothesized). The correlations between the three dimensions of perceived risks and frequency of online purchasing, dollar amount spent online, amount of time spent on Internet shopping are significant and negative (p < .05) as hypothesized. Furthermore, the dimension of time risk was negatively correlated with frequency of visiting (p < .05), therefore H2a, H2b, H2c and H2d were supported, further demonstrating that both measures behave as expected.

Predictive validity

Predictive validity, the ability of a measuring instrument to estimate some criterion behavior that is external to the measuring instrument itself, is demonstrated by the correlation between the instrument and the criterion variable (Nunnally & Bernstein, 1994). To assess predictive validity of online shopping motivations, a measure of intention to shop online was employed as the criterion variable. The extent and nature of future intentions to shop online is likely to be predicted by all seven online shopping motivations held by shoppers. Respondents were instructed to indicate their future online shopping intentions, the specific decision-making steps they completed online, and their intended frequency of using the Internet for each of these decision-making steps. Since predictive validity is shown by a significant correlation between two focal constructs, we hypothesized that all four positive shopping motivation constructs will be positively correlated with the measure of intention to shop online (both visiting and purchasing behaviors) and that all three negative shopping motivation constructs will be negatively correlated with the measure of intention to purchase online. Therefore:

H3. All four positive motivations will correlate positively with future visiting and purchasing intentions.

H4. All three negative motivations will correlate negatively with future purchasing intentions.

Correlation analyses revealed that our measure of visiting and purchasing behaviors correlated positively (p<.05) with the four positive motivations and that purchasing behaviors correlated negatively (p<0.05) with the three negative motivation. Therefore, both H3 and H4 were supported.

Additional Evidence of Scale Validity

Additional independent parallel research examined the effect of (1) consumers’ perceptions of innovation characteristics, (2) perceived characteristics of the Internet retailer, (3) self-efficacy, and (4) consumer demographics on the adoption of the Internet as a shopping medium (Liu, 2003; 2004, Forsythe & Liu, 2004). Liu (2003; 2004) found that three factors -- relative advantage of shopping online, enjoyment of shopping online, and risk associated with shopping online -- have a direct impact on consumers’ online shopping behaviors and their intention to continue shopping online. Two of the three factors identified by Liu -- relative advantage and enjoyment, reflect consumers’ positive motivations for shopping online; whereas the third factor -- perceived risks, reflects their negative motivations toward shopping online. These findings are consistent with our findings regarding the impact of positive and negative motivations on current and future online shopping behaviors, thereby providing additional evidence of the validity of the scales.

Practical Utility of the Scale

Finally, we used the data to group respondents into meaningful shopper segments to provide additional practical utility of the scale for Internet marketers. We divided respondents into two groups (purchasers and visitors) based on their current online shopping behaviors to determine how perceptions of shopping motivations differed for online purchasers vs. visitors. Findings revealed that purchasers rated the four benefits of Internet shopping higher than visitors (p<.10). Purchasers also evaluated the perceived risks to be less important than
visitors. Next we divided online purchasers into two segments (heavy and light online purchasers) based on their purchase frequency. We found that heavy purchasers similarly differed from light purchasers with regard to their perceptions of all the benefits and risks of online shopping except time risk. (Time commitment is likely to be similar whether one is just visiting or actually purchasing on the Internet) Given that marketers can easily segment their customers by shopping behaviors, these findings hold important practical implications for developing marketing strategies to address the motivations and risks important to each market segment.

To test for any change in consumers’ perceptions of the benefits and risks of shopping online over time, we compared the perceived benefits and risks means for the two samples. Data were collected from the second nationwide sample approximately two years after it was collected from sample one. Consumers in the second sample perceived 10 of the 16 the benefits of shopping online more positively than those in sample one and 11 of the 12 perceived risks as less of a hindrance to online shopping (p<.01). These findings indicate that risk factors are increasingly less likely to hinder Internet shopping and that more favorable perceptions of benefits are likely to play an increasingly important role in online shopping. Further, these findings demonstrate the increasingly powerful potential of the Internet to impact product evaluations and purchase decisions. Thus, it is increasingly important for US apparel marketers to make use of the Internet as a marketing medium.

**Effectiveness of the Internet as a Medium to Enhance Brand/Product Awareness, Evaluations, and Purchase Intentions**

To empirically examine the impact of selected website characteristics on online apparel shopping, a national online survey was conducted in year three. Using structural equation modeling, exploratory quantitative analysis identified three dimensions of perceived Internet retailers’ characteristics (product and selection, customer service and shopping incentives) and three dimensions of perceived innovation characteristics of the Internet shopping medium (relative advantages, perceived enjoyment and perceived risk) that significantly impact product evaluations and purchase intentions. An online apparel shopping behavior model was proposed and tested (GFI=.994; RMSEA=.014; p=.382). Perceived relative advantage is the most important dimension of innovation characteristics contributing to apparel purchase behaviors, while perceived risk had a negative effect on apparel purchasing behaviors. Three dimensions of the Internet retailers’ characteristics indirectly influenced consumers’ online apparel shopping behaviors through their perceptions of the relative advantage and risk associated with the as a Internet shopping medium. These results provide insights for increasing online apparel sales by enhancing the advantages of online shopping and reducing shoppers’ risk perceptions.

The findings of this research have important practical implications for Internet apparel retailers. The results show that online shoppers may be loyal to the medium, but not to an individual Internet retailer. It is easy for consumers to compare different retail websites and switch to the one generating more positive perceptions regarding advantage and enjoyment, as well as less negative perceptions of shopping risk. Therefore, in order to retain their customers, online apparel retailers need to have a strategy to continually improve their performance, particularly with regard to generating favorable perceptions of relative advantage and enjoyment and reducing perceptions of risk. Internet apparel retailers should tailor their Internet related technology, marketing strategies and other implementation devices to emphasize the criteria that the online apparel customers employ (e.g., relative advantage, enjoyment) when making decisions to purchase apparel products.

A two part study was then conducted to examine the impact of website characteristics, specifically, environmental cues (search/navigation, purchase/checkout and aesthetics) on consumers’ choice criteria (customer service quality, merchandise quality, monetary price, time/effort cost and psychic cost perceptions) and patronage intentions. Qualitative and quantitative research methods were used in this study to complement each other and compensate for any limitations of each methodology. Three stimulus websites were selected to represent slightly different website design quality levels. In study one, 12 subjects participated in the protocol analysis, a qualitative research method that captures consumers’ cognitive thoughts when performing a task on a website. Study one found that men and women behave differently when shopping for apparel online. For example, male shoppers prefer shopping by brand while female shoppers prefer product categories. In study two, a national sample of online shoppers evaluated the three stimulus websites and completed a survey instrument to measure each construct in the conceptual model. The consumer decision-making process was used as a basis to identify website environmental cues. Search/Navigation cues were found to be most influential on choice criteria evaluations and patronage intentions. Purchase/Checkout cues and aesthetic cues were also important factors influencing some choice criteria and the resulting patronage intentions. In contrast to study one – which provided more in-depth information about actual behavior on the stimulus websites, results from study two indicated that there were no significant differences in consumers’ overall perceptions of the website environmental cues for the three stimulus websites.

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These findings suggest that it is important to examine websites using multiple research methods to uncover differences that may not be captured by one methodology. It was helpful to use both methods to complement each other to better understand how consumers evaluate the website environment and interact with it to make a purchase decision. Results from both studies were integrated to provide better understanding of the impact of website environmental cues on consumers’ purchase behaviors when shopping the Internet. Collectively, these findings provide further support for the proposed model (overall objective) and result in an empirically tested measure for examining and predicting consumers’ online shopping behaviors that can be used as a basis for developing effective marketing strategies to foster more positive evaluations and purchase intentions for US apparel brands/products.

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Project website: http://www.auburn.edu/~forsysa/ntc_S03_AC23

References:


Figure 1: Results of Multi-Group Analysis for the Four Dimensions of Perceived Benefit

Chi-square = 1097.987, p = .000
df = 196
Chi-square/df = 5.602
GFI = .914
RMSEA = .055
P for test of close fit = .005

Hypothesized Model for Four Dimensions of Perceived Benefit
Figure 2: Results of Multi-Group Analysis for the Four Dimensions of Perceived Risk

Chi-square = 541.007, p = .000
df = 100
Chi-square/df = 5.410
GFI = .946
RMSEA = .054
P for test of close fit = .082

Hypothesized Model for Three Dimensions of Perceived Risk
### Table 1: Scale/item measurement properties

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Items</th>
<th>Coefficient α</th>
<th>EFA Item loading</th>
<th>Corrected item-total correlations</th>
<th>CFA item loading</th>
<th>Squared multiple correlation</th>
<th>Scale/item mean</th>
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<td></td>
<td></td>
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<td>S1</td>
<td>S2</td>
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<td>S2</td>
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<td>.90</td>
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<td>Shopping</td>
<td>Can shop in privacy of home</td>
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<td>.82</td>
<td>.69</td>
<td>.88</td>
<td>.79</td>
<td>.67</td>
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<td>I don’t have to leave home</td>
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<td>.78</td>
<td>.71</td>
<td>.84</td>
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<td>.63</td>
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<td>Can shop whenever I want</td>
<td>.76</td>
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<td>.60</td>
<td>.78</td>
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<td>.53</td>
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<td>Can save the effort of visiting stores</td>
<td>.70</td>
<td>.77</td>
<td>.65</td>
<td>.83</td>
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<td>.80</td>
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<td>Product</td>
<td>Items from everywhere are available</td>
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<td>.64</td>
<td>.70</td>
<td>.70</td>
<td>.75</td>
<td>.49</td>
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<td>Selection</td>
<td>Can get good product information online</td>
<td>.73</td>
<td>.48</td>
<td>.62</td>
<td>.56</td>
<td>.73</td>
<td>.25</td>
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<td>Broader selection of products</td>
<td>.62</td>
<td>.63</td>
<td>.62</td>
<td>.73</td>
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<td>.43</td>
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<td></td>
<td>Access to many brands and retailers</td>
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<td>.68</td>
<td>.63</td>
<td>.83</td>
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<td>Ease of</td>
<td>Don’t have to wait to be served</td>
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<td>.67</td>
<td>.63</td>
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<td>shopping</td>
<td>No hassles</td>
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<td>.44</td>
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<td>Not embarrassed if you don't buy</td>
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<td>.56</td>
<td>.45</td>
<td>.67</td>
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<td></td>
<td>No busy signal</td>
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<td>.56</td>
<td>.59</td>
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<td>Hedonic</td>
<td>To try new experience</td>
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<td>.65</td>
<td>.52</td>
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<td>Exciting to receive a package</td>
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<td>.44</td>
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<td>Can buy on impulse in response to ads</td>
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<td>.56</td>
<td>.39</td>
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<td>Can custom design products</td>
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<td>.65</td>
<td>.83</td>
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<td>May not get the product</td>
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<td>.70</td>
<td>.59</td>
<td>.82</td>
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<td>.55</td>
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<td>May purchase something by accident</td>
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<td>.52</td>
<td>.54</td>
<td>.59</td>
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<td>.30</td>
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<td>My personal information may not be kept</td>
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<td>.72</td>
<td>.70</td>
<td>.73</td>
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<td>My credit card number may not be secure</td>
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<td>.70</td>
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<td>Can't examine the actual product</td>
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<td>.70</td>
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<td>Size may be a problem with clothes</td>
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<td>Can't try on clothing online</td>
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<td>Inability to touch and feel the item</td>
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<td>Time risk</td>
<td>Too complicated to place order</td>
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<td>.60</td>
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<td>Difficult to find appropriate websites</td>
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<td>Pictures take too long to come up</td>
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