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Abstract

Purpose – The purpose of this paper is to present the results of an experiment in which participants view fictitious e-tailing web pages and indicate the likelihood of purchasing the products displayed by manipulating four attributes (familiarity with the e-tailer, product type, summary product review, and the number of customer reviews) in order to determine their relative importance.

Design/methodology/approach – Individual level conjoint models are estimated to determine the relative importance of the manipulated attributes. Furthermore, cluster analysis is used to group individuals into different segments.

Findings – The results suggest that the summary review star rating of the product and familiarity with the e-tailer are the two most important attributes. A three cluster solution is obtained and each segment is characterized by the derived relative influence each attribute has on likelihood of online purchase.

Originality/value – Understanding how consumers make choices among attributes especially when they are confronted with trade-offs has implications for e-tailers wishing to develop effective, targeted strategies for increasing the likelihood of online purchases.

Keywords E-trust, Conjoint analysis, Online reviews

Paper type Research paper

1. Introduction

The growth in electronic commerce (e-commerce) has been extraordinary, with many of today's business transactions being conducted online. The latest report published by the US Census Bureau estimates retail e-commerce sales for the first quarter of 2013 at $61.2 billion, an increase of 2.7 percent over the fourth quarter of 2012 (total retail sales increased only 1.1 percent over this same period). Compared to the first quarter of 2012, this estimate represents an increase of 15.2 percent, while total retail sales increased by 3.7 percent. Moreover, e-commerce sales in the first quarter of 2013 accounted for 5.5 percent of total sales (www.census.gov). Obviously, understanding what affects consumer willingness to buy online is essential for an electronic retailer (e-tailer) wishing to increase its share of an ever growing e-market.

Determining what influences consumer decisions to purchase products online has been an area of interest in e-commerce research for more than a decade. Trust, although conceptualized in different ways, has often been considered important for lowering the perceived risk associated with e-tailing and increasing the likelihood of online purchase (e.g. Lee *et al.*, 2004; Zhang, 2005; Kimery and McCord, 2006). Our study follows along this line of inquiry. Specifically, we estimate the effects of selected e-tailer and product related attributes on a consumer's likelihood of making a particular online purchase. To do this we use conjoint analysis, a method long used in marketing research studies (e.g. Green and Rao, 1971) but not widely used for e-commerce (e.g. Schaupp and Belanger, 2005; Chen *et al.*, 2010). Conjoint analysis provides the means to decompose

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overall judgments into "part-worths" that show the relative contributions of each attribute to the response variable (i.e. likelihood of online purchase). A documented advantage of this approach is that it forces respondents to "trade-off" among attributes in making their overall evaluation thus creating a more realistic decision-making scenario (compared to rating each attribute directly).

In this paper we present the results of an experimental study in which participants view fictitious e-tailing web pages and indicate for each the likelihood of purchasing the product displayed. The web pages are designed by manipulating four attributes that have been linked to perceived trustworthiness and risk (familiarity with the e-tailer, product type, summary product review, and the number of customer reviews). Individual level conjoint models are estimated to determine the relative importance of these attributes to online purchase likelihood. Furthermore, we use cluster analysis, based on the derived relative importance of these attributes, to group individuals into different segments. We profile each segment, not only in terms of the perceived influence of these attributes on consumers' decisions to buy online, but also in terms of observable demographic and behavioral characteristics. Doing so has implications for e-tailers wishing to develop effective, targeted strategies for increasing the likelihood that consumers will purchase from their web sites.

2. Literature review

Willingness to transact online, or in the case of e-tailing make a purchase, has received considerable attention in the e-commerce literature most often with the expressed purpose of motivating the intent and/or actual behavior. Conceptual models that describe the causal links between antecedents of intended or actual online transactions tend to be quite complex and draw on previous research in information systems (e.g. Gefen *et al.*, 2003) and services marketing (e.g. Salo and Karjaluoto, 2007; Sun, 2010). Trust, conceptualized in various ways, along with its associated dimensions of perceived risk, credibility, security and privacy, often appear in these models as well as in experimental studies attempting to determine empirically what impacts consumers' decisions to transact and/or purchase online.

2.1 The role of trust

Experimental studies, common in e-commerce research, allow for better control of the variables being investigated and for determining causal linkages not necessarily possible with survey methodology. A common theme among early experimental studies focusing on trust as an antecedent of online purchase transaction (intended or actual) was to evaluate the effect of third party assurance seals (e.g. VeriSign, eTRUST). For instance, Kimery and McCord (2002) found that the presence of third party privacy seals (specifically, eTRUST) on web sites did significantly and positively impact consumers' perceptions of e-tailers' trustworthiness. However, their study only used web sites of unfamiliar e-tailers. Noteberg *et al.* (2003), also interested in the effect of third party assurance, considered other factors such as product type and type of vendor. They found no significant difference in online purchase likelihood between the combinations of "known vendor/no third party assurance" and "unknown vendor/third party assurance" leading them to conclude that third party assurance is not necessary for e-tailers that are well known and reputable. Lee *et al.* (2004) found that third party assurance seals were strongly associated with the perceived trustworthiness of e-tailers (like Kimery and McCord), but only weakly associated with perceived risk. This was significant because they also found that the level of perceived risk strongly influenced online purchase

intention. Zhang (2005) examined how trust promoting seals affect consumers' willingness to buy from e-tailers. While the results indicate that such seals are generally effective at increasing consumers' willingness to buy online, the magnitude of this effect was found to depend on other factors (e.g. product category and prior online experiences). Specifically, third party assurance seals were found to be more effective at increasing willingness to buy for experience products and inexperienced online shoppers. Wakefield and Whitten (2006) found some empirical support to suggest that the perceived credibility of the third party organization providing the seal is the important factor, and this perceived credibility positively affects both seal value and trust in the e-tailer. Interestingly, the internet giant Google began issuing "Trust Badges" in 2012 to online stores that qualify by meeting specific performance standards based upon on-time delivery and customer service metrics.

Trust is a complex construct in e-commerce that goes beyond third party assurance seals. For instance, Paek *et al.* (2011) stress the role of behavioral theories such as Social Cognitive Theory and Theory of Planned Behavior in shaping trust within the context of social interactions and experiences. Tamimi and Sebastianelli (2007) operationalize e-trust using three empirically derived factors that represent reliability, assurance and credibility; of the three, reliability was found to be significantly most important to a national sample of online shoppers. Gefen *et al.* (2003) provide an excellent review of the many ways in which trust is conceptualized, both theoretically and operationally, and argue persuasively that online shopping involves not only interacting with an e-tailer's web site but with the e-tailer itself. Consequently, the model they propose integrates elements of technology acceptance model with knowledge-based, institution-based, and web-interaction based antecedents of trust. Among the antecedents to trust included was familiarity with the e-vendor. The importance of perceived reputation, that of the retailer as well as the brand, and its impact on credibility has been noted in conceptual frameworks on trust in e-tailing (e.g. Bramall *et al.*, 2004) and has received empirical support as a predictor of e-trust in experimental studies (e.g. McKnight *et al.*, 2004). Moreover, reputation enhancing strategies have often been discussed within the broader context of institutional-based trust (e.g. Chen and Dhillon, 2003). The continued relevance of vendor reputation is demonstrated by its inclusion in recent studies. For instance, Stokes and Jensen (2011), in an experimental study designed to extend the issue of trust beyond the security context, examined the effects of factors related to order fulfillment. They found that familiarity with the e-tailer as well as familiarity with the carrier can positively influence perceptions of e-tailer credibility. Li *et al.* (2012) cite several measures employed by e-tailers for building and maintaining trust, including feedback based on opinions of buyers, dispute services, privacy and security policies, web site design (e.g. ease of navigation), communication with buyers, payment services and return policy. Similarly, Ganguly *et al.* (2009) advocate the use of web site factors such as information design, communication, privacy and security to create trust and subsequently enhance purchase intention.

2.2 Product type

As noted above, product type has been included in some studies on third party assurance seals for its potential impact on willingness to buy online (e.g. Noteberg *et al.*, 2003; Zhang, 2005). The underlying presumption is that different types of products (search, experience, and credence) require different levels of emotional involvement on the part of the consumer, and consequently involve varying degrees of risk in an online environment. Search products, considered to be the least risky, are those for which

consumers can determine full information about dominant attributes "before purchasing" the product (e.g. books, personal computers). More risky are experience and credence products. Experience products are those for which dominant attributes can be determined only "after purchasing" the product (e.g. clothing, perfume). And credence products, are those for which attributes can be determined "after using" the product (e.g. vitamins, water purifiers). Understandably, product type has been cited as one determinant of transaction-specific uncertainty (Grabner-Kraeuter, 2002). Recently, Wan *et al.* (2012) found that prior web shopping experience significantly affects how consumers perceive the uncertainty of product quality for experience and credence products but not for search products. Gu *et al.* (2012) analyzed the relative impact of internal and external word-of-mouth (i.e. retailer hosted consumer opinions and product reviews vs independent sources such as Cnet) on sales for high involvement products (those requiring consumers to spend considerable time searching for product information to reach the best decision). They found that external word-of-mouth sources had a significant impact on retailer's sales for this type of product. Other product-related attributes have also been considered in discussions and/or studies about trust in e-commerce. These include price (e.g. Pennanen *et al.*, 2007) as well as brand (e.g. Harridge-March, 2006).

The role of product type in online shopping has also been established in studies other than those dealing with trust. For instance, Girard *et al.* (2003) postulated that the relationships between shopping orientations and demographic variables with purchase preferences on the internet would differ by product type. They found that the type of products purchased online differed by gender. Males preferred to shop online for search products (specifically cell phones and televisions). Females preferred to shop online for experience products (specifically clothing and perfume). In a strikingly similar study, Brown *et al.* (2003) found that product type, prior purchase on the internet, and gender were all significant in predicting online purchase intentions; shopping orientation was not found to be significant predictor. Furthermore, So *et al.* (2005) found empirical support that web-shopping intentions are higher for search goods compared with experience products.

2.3 Online reviews

The quality of product information has been cited repeatedly as being important in affecting trust in an online shopping environment. It has been used in defining the e-quality dimension of security because of its effect on consumers' perceptions of credibility (e.g. Alzola and Robaina, 2005); it has been found to influence consumers' commitment to a shopping site through its impact on the level of satisfaction with the product information provided (Park and Kim, 2006), and it has been found to positively affects consumers' perceived result demonstrability which in turn helps them develop trust toward an unfamiliar e-tailer (Yang *et al.*, 2006). Even the quantity of information provided was found to have a significant effect on consumer satisfaction, with more information resulting in higher levels of satisfaction (Ballantine, 2005).

Online consumer reviews are an important facet of product information. The results of a survey study conducted in 2013 reveal that 79 percent of consumers trust online reviews as much as personal recommendations (http://searchengineland.com). Retailers such as L.L. Bean, Wal-Mart, and Amazon.com mine billions of product reviews and use them as a quality tool to identify supply chain issues and defective products (Banjo, 2012). Chen and Dhillon (2003) note the relevance of testimonials from existing customers and satisfaction with products purchased (reviews) as a source of trust for web sites. Kim and Song (2010) found that the quality of word-of-mouth (e.g. online

product reviews) positively affects trust, which in turn positively affects perceived ease of use and perceived usefulness of the site, and consequently has a positive impact on intention to shop online. Based on results from an experimental study, Park *et al.* (2007) conclude that the quality of online reviews (determined on the basis of relevance, understandability, sufficiency, and objectivity) positively affects purchase intention. Moreover, they found that online purchase intention strengthens as the number of reviews increases. Zhu and Zhang (2010) contend that popular products tend to receive more reviews, and that having a large number of reviews makes online reviews more trustworthy. Cui *et al.* (2012) found that the volume of reviews has a significant effect on new product sales in the early period, although the effect decreases over time. This same study also demonstrated that that the percentage of negative reviews has a greater impact than that of positive reviews. Similarly, Sparks and Browning (2011) examined the impact of online reviews on hotel booking intentions and perceptions of trust and found that consumers are more influenced by early negative information, especially when the overall set of reviews is negative.

Several researchers examined the role of online reviews from the perspective of what make them valuable enough to be adopted and used by consumers. Baek *et al.* (2013) contend that for higher priced products and search goods, reviews that are more detailed are perceived as more helpful, while for lower priced products and experience goods, review rating and reviewer credibility are more important. A study by Mudambi and Schuff (2010) of customer reviews on Amazon.com found that lengthier reviews generally increase the helpfulness of the review, but this effect is greater for search goods than experience goods. In a study about food and restaurants, Cheung *et al.* (2008) found that two dimensions of information quality, relevance and comprehensiveness, impact the usefulness and therefore adoption of online reviews. Using panel data, Duan *et al.* (2008) assessed the persuasive effect (user rating) and awareness effect (volume) on movie box office performance. Their findings suggest that the awareness effect is important, as box office sales were significantly impacted by the volume of reviews posted online. Similarly, Hu *et al.* (2008) investigated the effects of low and high product coverage, coverage being defined as the total number of consumers reviewing a product, on the usefulness of newly added reviews. They found that a new review has greater impact when product coverage (number of existing online reviews) is low.

2.4 Consumer characteristics

Consumer characteristics such as attitude toward online shopping, personal values, and gender, have also been cited as affecting trust in e-commerce (Chen and Dhillon, 2003). McKnight and Chervany (2002), in a conceptual model designed to understand e-commerce customer relationship constructs, emphasized the inclusion of both dispositional trust and interpersonal trust (beliefs, intentions, behaviors). Trusting beliefs and intentions of e-consumers have been linked to characteristics such as level of web experience, age, and gender (McKnight *et al.*, 2004). For instance, after finding that third-party assurance seals neither captured online shoppers' attention nor created lasting impressions regarding the trustworthiness of e-tailers, Kimery and McCord (2006) recommended considering individual differences, including disposition to trust and past online experience. It has been suggested that direct online shopping experience increases trust in e-tailers (Bramall *et al.*, 2004), that inexperience with the internet decreases trust in e-tailers (Harridge-March, 2006), and that prior online purchase experiences are positively related to a customer's attitudes toward online shopping and purchase intention (Hernandez-Ortega *et al.*, 2008; Ling *et al.*, 2010). Lu and Chang (2013) examined the impact of cultural orientation on

consumer perceptions regarding the ethics of online retailers and found that cultural values partially affect attitudes toward e-tailers.

3. Research objectives

Familiarity with the e-tailer, product type and online reviews have been well documented in the e-commerce literature as key attributes linked to consumers' perceptions toward e-tailers as well as to likelihood of online purchase. Our study is unique. Rather than examine the impact of these attributes on likelihood of online purchase separately and apart from each other, we consider them simultaneously through the use of conjoint analysis. By manipulating specified levels for each attribute, we design fictitious web pages for which respondents evaluate the likelihood of purchasing the product displayed. This mimics a more realistic scenario because respondents must "trade-off" among the four attributes as they judge the web pages.

The primary research objective of this study is to derive the relative importance of four attributes (e-tailer reputation, product type, summary product review and number of reviews) based on consumers' overall judgments on the likelihood of online purchase from specific web pages. Additional objectives are to use the derived relative importance of these attributes as the basis for segmenting respondents into homogeneous groups and to profile these segments in terms of observable demographic and behavioral characteristics. The goal is to gain insight into how e-tailers may develop targeted strategies based on these four attributes in order to increase the likelihood that consumers will purchase from their web sites.

4. Research design

In order to balance the need for adequately representing all four attributes while keeping the number of judgments required by study participants manageable, we chose to conceptualize each attribute at two levels to design 16 fictitious e-tailing web pages. The specific e-tailing web page configurations are provided in Table I.

First, to examine the potential effects of e-vendor reputation (familiarity), web pages are shown for two different e-tailers, Amazon.com (arguably the best-known and most

Table I. Experimental e-tailing web page configurations ($2 \times 2 \times 2 \times 2$ design)

Configuration	E-tailer	Product	Product review	Number of reviews
1	Amazon.com	iPod	4½ stars	5
2	Amazon.com	Watch	4½ stars	5
3	Amazon.com	iPod	1½ stars	5
4	Amazon.com	Watch	1½ stars	5
5	Amazon.com	iPod	4½ stars	307
6	Amazon.com	Watch	4½ stars	307
7	Amazon.com	iPod	1½ stars	307
8	Amazon.com	Watch	1½ stars	307
9	Nile.com	iPod	4½ stars	5
10	Nile.com	Watch	4½ stars	5
11	Nile.com	iPod	1½ stars	5
12	Nile.com	Watch	1½ stars	5
13	Nile.com	iPod	4½ stars	307
14	Nile.com	Watch	4½ stars	307
15	Nile.com	iPod	1½ stars	307
16	Nile.com	Watch	1½ stars	307

reputable e-tailer) and Nile.com (an unknown e-tailer as it does not exist). Second, we vary the product type shown on the web pages. We display two different products: the Apple iPod and the Technocrat Swiss unisex watch. The iPod is a search product that is relatively low priced, and therefore can be considered low risk. The watch, by contrast, is high priced and has the potential of being very high risk given the possibility of counterfeit watches being sold online. Moreover, this particular watch with diamonds can be considered a fashion (jewelry) piece making it an experience product. In order to capture the potential impact of electronic word-of-mouth, we include two attributes related to online product reviews. First, we vary the summary review rating for the product by using 4½ stars vs 1½ stars on a five-star format. Second, we vary the number of customers that provided reviews for the product (5 vs 307). Consequently, we deal with both aspects of online reviews considered in previous research, quality and quantity. Moreover, these attributes deal with perceived trust in two ways:

(1) trustworthiness of the product by providing information about other online consumers' experiences with it; and

(2) trustworthiness of the e-tailer since we can presume the higher the number of reviews the more purchases were made from the e-tailing site.

5. Data collection

Research participants were recruited from a university setting to take part in an experimental study about "online shopping" during the spring of 2012. Flyers were used to publicize the study and provide details regarding compensation and session times. The conjoint task was one of several tasks to be completed during the session. The study was carried out over multiple sessions.

For the conjoint task, participants were instructed to first preview the 16 different web pages. Then they were told to revisit each web page, and assuming that they were interested in purchasing the product displayed, estimate the likelihood that they would purchase from the particular web site. Specifically, they were instructed as follows: estimate the likelihood that you would purchase this product from this web site. Provide a probability between 0 (would not) and 100 percent (would with certainty). Participants also completed a brief survey that gathered data on demographics and online browsing and shopping behaviors.

6. Data analysis

Ordinary least squares (OLS) regression was used to estimate the individual level conjoint models for each participant. OLS is appropriate since the response variable, online purchase likelihood, is at least interval scaled. Each of the 16 fictitious e-tailing web pages was coded based on the four attributes as follows: e-tailer (1 = Amazon, 0 = Nile), product (1 = Watch, 0 = iPod), summary product review (1 = 4½ stars, 0 = 1½ stars), and number of reviews (1 = 307, 0 = 5). Consequently, the attributes are observations on the predictor variables and the estimated regression coefficients are the "part-worths." Since each attribute is conceptualized at only two levels, the magnitude of the estimated part-worth represents the relative contribution (or relative importance) of that particular attribute to the response variable (probability of online purchase). In this context, R^2 represents the internal consistency of the responses given by an individual.

Cluster analysis, based on the estimated part-worths of the individual conjoint models, is used to group participants into segments that are similar with respect to how

the attributes influence the probability of online purchase. The Ward's minimum variance algorithm, a hierarchical agglomerative procedure that minimizes within cluster sum of squares, is used to perform the analysis.

7. Results

7.1 Respondent profile

A total of 122 participants took part in the study. Participants included undergraduate students, graduate students and professional staff. Respondents range in age from 19 to 66, with an average of 27.2 years. About 30 percent is older than 22, suggesting that the majority consists of typical undergraduate students. They are predominately female (65 percent) and most are employed at least part-time (27 percent full-time and 38 percent part-time). Additional information regarding online shopping behaviors, such as browsing and purchasing from e-tailers, is provided in Tables II-IV. Over 62 percent have made between one and six online purchases in the last three months; almost 80 percent make at least six purchases from online retailers, on average, per year. The vast majority of respondents (almost 75 percent) report frequent browsing of e-tailers, on a daily or weekly basis.

7.2 Conjoint results

Conjoint models were estimated at the individual level for all 122 participants. Summary results for the estimated part-worths (regression coefficients) across all participants are presented in Table V. Since each attribute is conceptualized at only two

Table II.
Online purchasing behavior of study participants

Number of online purchases made in the last 3 months	Number	%
None	9	7.4
1-3	39	32.0
4-6	37	30.3
7-9	15	12.3
10 or more	22	18.0

Table III.
Online purchasing behavior of study participants

Frequency of purchasing from online retailers (per year)	Number	%
0-5	26	21.3
6-12	37	30.3
13-20	33	27.1
21-36	16	13.1
36 or more	10	8.2

Table IV.
E-tailer browsing behavior of study participants

Frequency of browsing online retailers	Number	%
Daily	37	30.3
Weekly	54	44.3
Monthly	26	21.3
Only a few times per year	5	4.1

levels, the absolute magnitude of the estimated part-worth provides its relative contribution (or its relative importance) to explaining the likelihood of online purchase.

On average, the signs of the estimated regression coefficients are in the directions expected; consumers are more likely to purchase the product displayed if the e-tailer is Amazon and the product is an iPod with a 4½ star rating based on 307 online reviews. Moreover, the results suggest that the summary review star rating of the product and familiarity with the e-tailer are the two most important attributes. Furthermore, the percentage of individuals for which the summary review star rating was the most important attribute affecting purchase likelihood was 64.75 percent. This percentage was 24.59 percent for e-tailer, and only 5.74 and 4.92 percent for number of reviews and product, respectively. The R^2 values ranged from 2.7 to 100 percent, with a mean of 64.7 percent. Approximately 75 percent of participants had conjoint models with R^2 values higher than 57 percent.

7.3 Cluster analysis results

Agglomerative hierarchical clustering, based upon the part worth (regression coefficient) estimates of individual conjoint models, was used to form segments that maximize similarity within groups (and dissimilarity between groups). A three cluster solution is obtained, and each segment is characterized by the derived relative influence each attribute has on likelihood of online purchase (see Figure 1 and Table VI).

Segment 1 is the smallest with $n_1 = 17$. Like the group as a whole, this segment places the most importance on the summary review star rating of the product and familiarity with the e-tailer, although the difference in relative importance of these two

Model	Mean	SD	Median	Min.	Max.
Constant	12.06	23.76	6.78	−26.37	78.44
Summary review (1 = 4½ stars, 0 = 1½ stars)	34.50	19.96	35.81	−8.75	87.50
E-tailer (1 = Amazon, 0 = Nile)	17.33	17.70	15.00	−15.25	100.00
Number of reviews (1 = 307, 0 = 5)	9.04	12.41	9.25	−18.50	39.37
Product (1 = watch, 0 = iPod)	−8.92	12.41	−7.50	−50.62	19.37

Table V.
Summary estimation results for all participants

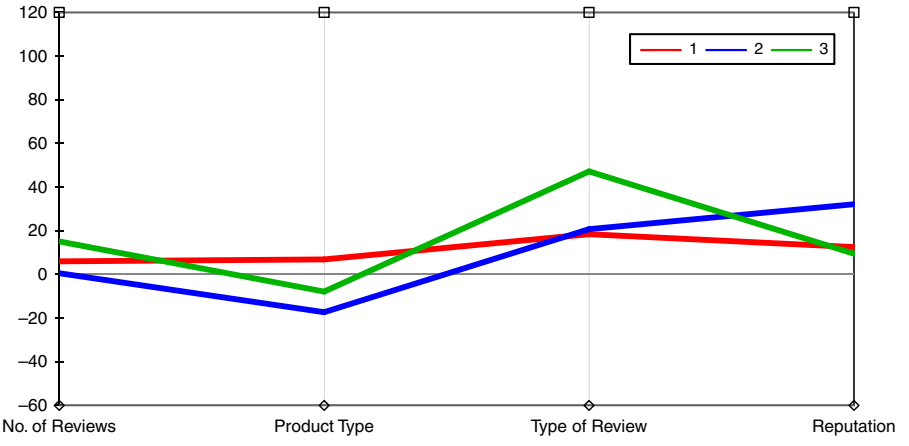

Figure 1.
Mean attribute part-worths by segment

attributes is not as great. Interestingly, this is the only group that is more likely to make the purchase if the product displayed is the Technocrat Swiss unisex watch (experience product) rather than the iPod (search product). Of the three segments, this group is the youngest (average age is 24.7) and the only one with the majority of males (53 percent). Compared to the other two segments, this group is the most likely to make over 20 online purchases per year (29 percent).

Segment 2 consists of 40 individuals. Familiarity with the e-tailer is the most important attribute to this group, followed by the summary review star rating of the product. It is distinguished from other segments by the much higher relative importance it places on product type. This group tends to be older (average age is 26.7), most likely to be employed full or part-time (70 percent), and is predominately female (68 percent). While this group reports browsing e-tailers on a frequent basis (73 percent say daily or weekly), only 17 percent makes over 20 online purchases per year. Moreover, this group is the least likely to use online reviews on a frequent basis (67 percent report doing so "often" or "always").

Segment 3 is the largest with $n_3 = 65$. This group clearly places the highest relative importance on the summary review star rating of the product, followed by the number of reviews. This online review oriented segment is the oldest (average age is 28.2) and is mostly female (68 percent). Compared to other segments, this group is the most likely to browse e-tailers on a frequent basis (77 percent do so daily or weekly). Moreover, this group has the highest percentage (85 percent) that report using online reviews "often" or "always."

8. Discussion and limitations

The results from our conjoint study indicate that the two attributes exerting the most influence on the likelihood of purchasing a product online are the summary star review rating of the product and familiarity with the e-tailer. These findings are consistent with previous research (e.g. Kim and Song, 2010; Stokes and Jensen, 2011). The likelihood of online purchase for participants in our study was much less affected by product type or number of reviews, at least at the aggregate level. However, cluster analysis on the estimated part-worths of individual conjoint models identified three distinct segments that offer some insights into how these results may depend on differences in consumer characteristics (including browsing and online shopping behaviors).

Product type had higher relative importance for one group, Segment 2. This group reported having less prior online shopping experience, and consequently less experience using online reviews, than the other two groups. In addition, Segment 1, the group that reported the most prior online purchasing experience, was actually more likely to buy the product displayed on the web page if it was the expensive, Technocrat Swiss unisex watch. It appears that higher levels of prior online shopping experience

Table VI. Summary estimation results by segment

Model	All $n = 122$	Group 1 $n_1 = 17$	Group 2 $n_2 = 40$	Group 3 $n_3 = 65$
Summary review (1 = 4½ stars, 0 = 1½ stars)	34.50	18.40	20.71	47.06
E-tailer (1 = Amazon, 0 = Nile)	17.33	12.52	32.12	9.62
Number of reviews (1 = 307, 0 = 5)	9.04	5.99	0.52	14.93
Product (1 = watch, 0 = iPod)	−8.92	6.86	−17.32	−7.74

may serve to reduce perceived risk and therefore make product type less influential in the decision to buy online. In addition, number of reviews had higher relative importance (second only to the summary star review rating of the product) for one group, Segment 3. This group has the highest percentage of individuals who frequently browse e-tailers and use online reviews. This suggests that the level of experience in using online reviews, and perhaps browsing, may affect how much attention consumers pay to the volume of reviews upon which a summary rating is based.

Although conjoint analysis offers a more realistic way to determine the relative importance of attributes in decision making, few e-commerce studies have employed the methodology. Keen *et al.* (2004) used the approach to understand consumers' purchase decisions when faced with alternative retail formats, namely store, catalog, and the internet. They found that the two attributes most important in guiding the decision-making process were retail format and product price. Schaupp and Belanger (2005) considered how attributes related to technology (security, usability and site design, privacy), shopping (convenience, trustworthiness, delivery), and product (merchandising, product value, product customization) affect customer satisfaction. Based on data collected from a sample of undergraduate students, they found that the most important attribute by far was privacy followed by merchandising. Chen *et al.* (2010) used conjoint analysis to examine the impact of seven attributes (security, privacy, usability, convenience, trust, delivery and product value) on online purchase intention. While they too used simulated online shopping web sites, these were designed by manipulating only two of the attributes: security and privacy. The other attribute levels were apparently rated directly. Cluster analysis revealed three distinct segments (usability/delivery-oriented, security/trust-oriented, and convenience/trust-oriented) and the researchers concluded that online shopping web sites should focus on usability, delivery, security, trust and convenience in order to increase online purchase intention.

As in most research, a number of decisions are required in a conjoint study. These include choosing the data collection method, attributes and levels, measurement scale for the response, and estimation method. Our study differs from previous applications of conjoint analysis in e-commerce research in several important ways. First, to our knowledge, we are the only study to include attributes related to online product reviews. Second, we use a complete factorial design of all attributes in constructing the fictitious web pages. While this limits the number of attributes (and levels) that can be used, it does result in a task that requires a more complete "trade-off" since all attributes are manipulated. Third, our study extends the realism afforded by conjoint methodology by including only web pages for participants to view (with no verbal descriptions). Finally, while the majority of participants in our study are typical undergraduates, they are not exclusively undergraduate students. This offers some variation in terms of demographics and online browsing and shopping behaviors that help to describe segments with differing attribute importance profiles.

Our study is not without its limitations. First, we restrict attention to only four attributes, each at two levels, in order to limit the number of judgments required in the experimental task. There are obviously other factors that may have been considered. Second, our findings depend, at least in part, on the design of our conjoint study (i.e. how we conceptualized each attribute, how we measured the dependent variable). Finally, our sample was not randomly selected but participants were recruited to participate in a study about "online shopping." This may have biased the sample toward individuals with more experience shopping online, and perhaps a more favorable attitude toward shopping online, compared to the general population.

9. Concluding remarks

As with any research methodology, conjoint analysis is not without its limitations. Nonetheless, its advantage of providing a more realistic task makes it a promising methodology for better understanding the attributes affecting consumers' decisions about online purchasing and other e-commerce transactions and online activities. By using conjoint methodology, we are able to derive the relative importance of four specific attributes (familiarity with the e-tailer, product type, summary product review, and the number of customer reviews) on likelihood of online purchase. These four attributes have been cited repeatedly in the e-commerce literature as affecting consumers' perceptions of trust, risk, and willingness to buy online, yet few studies have considered their effects simultaneously. The ability to derive the relative importance of attributes from overall judgments about purchase intention, and then to use these derived values to segment customers, is valuable from both a research and practical perspective.

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