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Identifying Discriminating Variables of Online and Offline Buyers: A Perceived-Risk Approach

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Abstract

The article tested the capacity of nine variables in discriminating between online (WWW) buyers and offline buyers. Eight product categories were analysed. The findings suggest that the "skill level" and "security" are the best predictive variables that discriminate between online and offline buyers. Surprisingly, the variables related to convenience are unable to differentiate between the two groups. In addition, the results confirm the hypothesis that consumers' perceived risk vary across product categories.

Introduction

The Internet, and most particularly, the WWW (Worldwide Web) has transformed the American market (Bankston, 1996; Lottor, 1997). Even tough forecasted figures vary across sources (Modahl, 1995; and Hambrech and Quist, 1996), they all suggest that the WWW has a strong impact on the new economy as an in-home shopping channel (Van den Poel and Leunis, 1996). As a result, many authors have analysed the variables considered by consumers when choosing or not the WWW as an in-home shopping channel (Bellman et al., 1999; Burke, 1997; McGaughney and Mason, 1998). However, whereas many conceptual studies have analysed the attributes that involve the utilization of the Web, few of them have tried to identify statistically the predictive variables that discriminate between online and offline buyers. Consequently, we focused our research on two basic objectives: (1) Identify the variables that discriminate between online and offline buyers; (2) Analyse if these variables vary across product categories. We consider here offline buyers as those who already bought the specified products in the stores or by catalogs, but have never bought them on the WWW.

Literature Review

The In-home shopping concept is not new. Berkowitz et al. state that "pushcart vendor selling fruits and vegetables, the chicken farmer with a city egg route, and the local grocer who took telephone orders and hired teenagers to deliver them were common sources of food for many urban consumers" (Berkowitz et al., 1979, pg. 15). Catalogs, for instance, have been implemented in 1888 by Sears Roebuck and today represent a tenth of the American retailing market (The Economist, 2000). However, we had to wait until the 60's to see the scientific exploration of this particular marketing phenomenon.

Telephone shopping has been one of the first in-home shopping mentioned in the literature (Cox and Rich, 1964). The authors found that the "need for convenience" and the way in which subject perceived and dealt with the risks were the major characteristics of telephone shoppers. Time pressure and distance appeared as convenience factors. Subjects (all women) residing in suburbs and placing a high value on "fast shopping" were more likely to shop by telephone. Similarly, subjects, which did not shop by telephone, perceived it as very risky and had no ability to relieve it - through information acquisition on newspapers advertising, for instance. In addition, the authors suggested the existence of a strong relationship between past experience and perceived risk of ordering by telephone.

During the 70's and 80's many authors studied the relationship between catalog shopping and perceived risk. (Troy, Don and Tsalikis, 1986; Hawes and Lumpkin, 1986; Berkonwitz et al., 1979; Reynolds, 1974). Hawes and Lumpkin compared the perceived risk of six patronage modes. The results suggested that department stores and speciality stores had the same low level of perceived risk. Discount stores and catalog stores have both an intermediary level of perceived risk. And, finally, media advertisement and direct mail/other catalogs are perceived as the most risky marketing channels (Hawes and Lumpkin, 1986). It is interesting to note here that the existence of physical store seems to reduce the perceived risk of the catalog store. It may be a reasonable explanation of why catalog stores are less risky than direct mail/other catalogs. The authors also investigated the effectiveness of risk handling tactics, which equate the concept of risk relief (Roselius, 1971). Price reduction, personal experience and money-back guarantee were identified as the most effective tactics. In other words, financial risk relievers (price reduction and money-back guarantee) and performance risk relievers (personal experience) influenced the patronage mode adopted by consumers.

Festervand et al. also tested the impacts of experience. They first suggested that, despite the boost of the direct mail industry, consumers still perceived catalog shopping as being more risky than traditional shopping. However, they confirmed the hypothesis that prior satisfying experience reduces the perceived risk of shoppers, which may, partially, explain why the industry kept growing. In addition, the authors found that for the 9 products tested, performance risk and time/convenience were perceived as being significantly higher when bought by catalog than when bought in a retail store. In addition, financial risk was significantly higher for 8 out of 9 products bought by catalog (Festervand et al., 1986).

Other authors have also measured the relevance of convenience. Reynolds tested nine hypotheses comparing catalog to store shopping. The results demonstrated that the perception of convenience and the innovative lifestyle are the two most important factors that differentiate catalog buyers from others (Reynolds, 1974). Bellman et al. cited the same factors when analysing the consumer behavior on Internet. These authors suggest that *time starvation* and *wired lifestyle* form the profile of WWW buyers (Bellman et al. 1999). Berkowitz and colleagues investigated in-home food retailing and also found that inhome shoppers "*place a higher value on shopping convenience than store shoppers*" (Berkowitz, 1979 p. 27).

Recently, in one of the pioneer studies, Van den Poel and Leunis tested the effectiveness of the WWW as a marketing channel and found that the Internet is not considered "as just another mail-order channel" (Van den Poel, 1999, pg. 252). The results suggested that the convenience/time of the WWW is perceived higher than the traditional mail-order channel. Moreover, the article also suggests that price reductions, money-back guarantees and well-known brands are good risk relieving strategies. The authors also point out the existence of a relationship between the product category and the likelihood of using the Internet. Airline tickets, hotel accommodations and flowers for delivery, for instance, have better acceptance than tax advices and newspapers. Other researchers have also cited the influence of product category on the perceived risk of marketing channels. (e.g. Cox and Rich. 1964: Spence et al. 1970: Dash. Schiffman and Berenson, 1976; Hisrich et al. 1972).

In summary, the literature regarding different types of in-home shopping (telephone, catalogs, and Internet) converge on the following: (1) Perceived risk is higher for in-home shoppers than for retail shoppers; (2) Important types of perceived risk are: financial risk (e.g. price and guarantees), performance risk (e.g. past experience), and convenience (e.g. time saving); and (3) Perceived risk vary across product categories.

Hypothesis

Based on the convergent statements mentioned above we classified our hypotheses in 4 groups. Since we used a secondary data source, our research has been restricted to the variables available in the database. Nine variables have been chosen to represent the three major dimensions identified in the literature (performance risk, financial risk and convenience).

Performance risk – Includes variables related to consumers' past experience and expertise. Our assumption is that the more consumers feel comfortable with the WWW (previous experience) the more they will use it. Consequently, the skill level, frequency of searching (with intent to by), and frequency of browsing (without intent to buy) are experience and expertise variables that may reduce the performance risk and discriminate between the two groups. It's important to highlight here that the variable skill level represents the consumer's perceived skill regarding the use of the WWW (e.g. novice, intermediate, experienced or expert). Appendix 1 shows in detail all dimensions, variables and respective scales.

H1a: The variable *Skill Level* discriminate between online buyers and offline buyers.

H1b: The variable *Frequency of Searching* discriminate between online buyers and offline buyers.

H1c: The variable *Frequency of Browsing* discriminate between online buyers and offline buyers.

Financial risk - Represents variables involving the financial transaction itself. For instance, consumers who perceive the use of credit card (security) on the WWW as being safe, and consumers who perceive the WWW products as cheaper (price) are those who normally buy online.

H2a: The variable *Security* discriminate between online buyers and offline buyers.

H2b: The variable *Price* discriminate between online buyers and offline buyers.

Convenience – We suggest that consumers will differ in their perception regarding the convenience of shopping online. In fact, our assumption is that online buyers perceive the WWW as more convenient than offline buyers.

H3a: The variable *Usefulness of Information* discriminate between online buyers and offline buyers.

H3b: The variable *Ease of placing orders* discriminate between online buyers and offline buyers.

H3c: The variable *Ease of cancelling orders* discriminate between online buyers and offline buyers.

H3d: The variable *Availability of vendors* discriminate between online buyers and offline buyers.

Product Category- Finally, as product characteristics vary, it can affect the consumers perceived risk regarding the nine variables analysed.

H4: Consumer's perceived risk (financial, performance and convenience) regarding the online shopping varies across product category.

Method

In order to test the hypotheses we used the data available on the GVU Center Website (Georgia Tech Graphics, Visualization & Usability). Since January 1994, the GVU Center has been issuing, twice a year, Internet surveys related to consumer behavior on the Web. For our purpose, we used the survey *Finding Product Information and Purchasing*. The data were collected from October to December 1998, via Internet. The researchers adopted a non-probabilistic sampling. Six hundred forty-five subjects were self-selected.

Questionnaire and Items Measurement

The questionnaire included questions about consumers' searching and purchasing behavior on the WWW. For our purpose, we used basically 2 groups of questions. The first type of questions was used to determine the consumers group: online buyers (WWW) or offline buyers (catalogs and retail stores) across 8 product categories (Computer hardware less than \$50; Computer hardware more than \$50; Computer Software less than

\$50; Computer Software more than \$50; Investment choices; Music CDs/Tapes/Albums; Books/Magazines; Travel Arrangements).

The second group of questions identified the consumers' perception and attitudes towards the WWW and their experience with this new channel (see Appendix 1). These questions allowed us to identify the variables related to financial, performance and convenience issues. The two statements about price and security on the WWW were included in the *financial risk*. *Convenience* was measured by 4 statements about: the usefulness of information, the ease of placing orders, the ease of cancelling orders and availability of the WWW vendors. The 3 questions about the skill level, the frequency of searching and the frequency of browsing on the WWW are related to the *performance risk*. These statements and questions allowed us to measure the nine variables described on the hypotheses.

We used a *Stepwise Discriminant Analysis* to test the hypotheses (Mahalonobis distance / F value of entry = 3,84 and F value of removal = 2,71). The dependent variables (categorical) are the two groups of buyers – online and offline. The 9 independent variables (likert-type scale) were used to form a linear combination to discriminate a priori between the two groups. The discriminant functions allowed us to identify which of the 9 independent variables were able to discriminate, and at which extent, between online and offline buyers. We developed 8 independent stepwise discriminant functions, one for each product. All discriminant functions discriminate significantly between the two groups (See Table 1).

| Variables | Computer | Computer | Computer | Computer | Investment | Music | Books | Travel |
|------------|----------|----------|-----------|----------|------------|--------|--------|--------|
| | Hardware | Hardware | Software | Software | (stocks) | (CDs, | | |
| | (-) \$50 | (+) \$50 | (-) \$ 50 | (+) \$50 | | Tapes) | | |
| Chi-square | 51,275 | 68,517 | 80,474 | 45,537 | 21,061 | 36,373 | 22,054 | 22,121 |
| | | | | | | | | |
| df | 3 | 4 | 4 | 3 | 2 | 3 | 2 | 2 |
| | | | | | | | | |
| Sig. | P<,001 | P<,001 | P<,001 | P<,001 | P<,001 | P<,001 | P<,001 | P<,001 |
| | | | | | | | | |
| n | 220 | 257 | 257 | 201 | 147 | 271 | 196 | 266 |
| 11 | 528 | 557 | 337 | 321 | 14/ | 3/1 | 100 | 200 |
| | | | | | | | | |

Table 1: Significance test of the Discriminant Functions

Sample

Our calibration sample (which represented 67% of the total sample) varied from 147 to 357 subjects, depending on the product category. We used the other 33% to

validate the results. According to the validation sample, the 8 product functions correctly classified from 60% to 77% of the subjects depending on the product category (See Table 2).

Table 2: Validation Sample for the 8 functions

| | Computer | Computer | Computer | Computer | Investment | Music | Books | Travel |
|-------------|----------|----------|-----------|----------|------------|--------|-------|--------|
| | Hardware | Hardware | Software | Software | (Stocks) | (CDs, | | |
| | (-) \$50 | (+) \$50 | (-) \$ 50 | (+) \$50 | | Tapes) | | |
| Calibration | 67,1% | 68,3 | 73,3 | 67,1 | 67,3 | 65,8 | 67,7 | 63,5 |
| Sample | n=328 | n=357 | n=357 | n=321 | n=147 | n=371 | n=186 | n=266 |
| _ | | | | | | | | |
| Validation | 69,1% | 66,7 | 71,1 | 77,3 | 60,0 | 62,3 | 71,6 | 60,8 |
| Sample | n=110 | n=111 | n=129 | n=105 | n=45 | n=130 | n=67 | n=97 |
| _ | | | | | | | | |

Table 3: Standardized functions for the 8 products.

| Variables | Computer | Computer | Computer | Computer | Investment | Music | Books | Travel |
|------------------------------|-------------------|-------------------|-------------------|--------------------------|-------------------|-------------------|---------------|--------------------------|
| | Hardware | Hardware | Software | Software | (Stocks) | (CDs, | | |
| | (-) \$50 | (+) \$50 | (-) \$ 50 | (+) \$50 | | Tapes) | | |
| PR-Skill level | ,717 ^a | ,707 ^a | ,672 ^a | ,760 ^a | ,797 ^a | ,727 ^a | ,644 ª | ,740 ^a |
| PR-Frequency of Searching | ,621 ^a | ,514 ^a | ,541 ^a | ,591 ^a | ,253 | ,338 | ,175 | ,162 |
| PR-Frequency of Browsing | ,339 | ,299 | ,320 | ,338 | ,141 | ,508ª | ,139 | ,159 |
| FR-Security | ,567 ^a | ,493 ^a | ,600ª | ,542 ^a | ,300 | ,268 | ,275 | ,813 ^a |
| FR-Price | ,237 | ,599ª | ,322 | ,235 | ,224 | ,285 | ,213 | ,278 |
| C-Usefulness of Inform. | ,275 | ,326 | ,367 | ,273 | ,279 | ,345 | ,288 | ,314 |
| C-Ease to place orders | ,306 | ,289 | ,362 | ,309 | ,747 ^a | ,645 ^a | ,888ª | ,350 |
| C-Ease to cancel orders | ,108 | ,154 | ,239 | ,127 | ,208 | ,208 | ,306 | ,149 |
| C-Availability of vendors | ,076 | ,148 | ,293 ^a | ,118 | ,257 | ,231 | ,310 | ,134 |

Pooled within-groups correlation between discriminant variables and standardized canonical discriminant functions. Variables ordered by absolute size of correlation within function.

^a = Discriminating variables included in the function -stepwise method.

PR - Performance Risk

FR - Financial Risk

C - Convenience

Findings

Table 3 describes the standardized functions for the 8 products and the 9 independent variables tested, which allowed verifying the hypotheses. For all products no more than four variables were accepted in the discriminant functions. The variables related to the performance risk factors (based on previous experience) played a major role for all products. Financial risk and Convenience variables vary across product categories.

Performance Risk (H1a, H1b, H1c)

As mentioned earlier, the consumer's perception of performance risk is essentially based on its previous experience and expertise about the product or, in our case, the marketing channel. The skill level (H1a) was classified for all products as the most or the second most important predictive variable, capable to discriminate between online and offline buyers. In other words, consumers who have a high skill level on the WWWprevious experience - perceive the performance risk quite lower than those who have a low skill level, stimulating the former to use the WWW as a marketing channel more extensively than the later. Frequency of Searching (H1b) has an impact on 4 out of 8 product categories. It demonstrates that searching on the WWW can also, for some products, discriminate between online and offline buyers. The results suggested, however, that the Frequency of Browsing (H1c) is not differently evaluated between the two groups (except for music products). In other words, consumers who browse a lot do not, necessarily buy on the web.

Financial Risk (H2a, H2b)

Two variables were used to test the impact of financial risk on the WWW. Subjects were asked to identify how they perceived the security issues and prices available on the WWW. The results showed that security (H2a) is an important predictive variable to differentiate between online buyers and offline buyers. For 5 of the 8 product categories, security was included in the discriminating function. It must be highlighted that the data used in our research were collected on October 98. Since, a lot of improvement regarding security issues has been implemented and may have changed consumers' perception. Van den Poel and Leunis, for instance, addressing similar issues, asked respondents to ignore the security considerations in their evaluations of the Internet offers, suggesting that it is just a temporary technical problem (Van den Poel and Leunis, 1999).

The variable price (H2b) was included in only one discriminant function – "computer hardware more expensive than \$50". In other words, the price is not able to predict who buys or not on the Web. In fact, it is not surprising. Some researchers have found that prices are not cheaper on the WWW (Lee; 1995 and Bailey, 1998a, 1998b). Thus, we can confirm that financial risk discriminates between online and offline buyers. However, only security, not price, represents here the financial risk dimension.

Convenience (H3a, H3b, H3c, H3d)

To test the impact of convenience, we used four variables: Usefulness of the information available; Ease of placing orders; Ease of cancelling orders; and Availability of vendors. Surprisingly, the results suggested that, in general, convenience is not a predictive dimension of online and offline buyers. However, at least one of the four variables deserves a more careful examination.

Table 3 demonstrates that the variable "Ease of placing orders" (H3b) is accepted for just 3 of the 8 products. An ANOVA test confirmed that a difference exists between online and offline buyers for all products (F varying from 4,743;p<0,03 to 20,575;p<0,001). However, that difference it not enough when we use a stepwise discriminant analysis. Consequently, the results suggest that this variable does not have a predictive power to identify who will or will not buy online. In addition, this variable was evaluated on average at 3,63 (likert-type scale from 1-5) for online and offline buyers together, representing the highest evaluation compared to the other convenience and financial risk variables. As a result, we can affirm that consumers in general - online and offline know that the Internet is a very easy channel to place orders. In other words, these two groups have relative similar perceptions, which reduces the predictive power of

the variable. Regarding the other convenience variables (H3a, H3c, H3d), the results are clear. The usefulness of information (H3a), the ease of cancelling orders (H3c), and the availability of WWW vendors (H3d) do not discriminate between the two groups. Further research is necessary to better understand the impact of those variables.

Product Category (H4)

As we can see on Table 3, it seems that consumers' perception about the WWW vary across product categories (H4). In fact, we found some elements that can help us better explain why these variations occur. First, the 4 categories of computer related products (hardware and software, more or less expensive than \$50) are characterized by similar discriminant functions with 3 variables in common: skill level, frequency of searching and security. It may be explained by looking at the consumer side. In fact, these products are normally bought by a particular segment of consumers who share the same "wired lifestyle" (Bellman et al., 1999), and consequently are sensible to similar variables. For Travel Arrangements, on the other hand, the explanation comes from the product's nature. Since these services normally have a higher value, increasing the perceived financial risk, it's logical to understand why security is considered an important element. Music and Books shared also common patterns. Skill level and Ease of placing orders are included in both discriminant functions. In summary, we are tempted to accept the H4, which suggests that the variables discriminating between online and offline buyers vary across product categories. However, despite the fact that we can clearly see different functions for different products, we did not use any statistical procedure to confirm or infirm those differences, which represents a limitation.

Conclusion and Limitations

Our research identified the predictive variables in order to differentiate two groups of consumers: online and offline buyers. Nine variables classified in three dimensions were tested. The results suggested that consumers' skill level (performance risk) and security (financial risk dimension), are the two most important variables that discriminate between online buyers and offline. The limitations of the article are essentially based on the limitations of using a secondary data source. Since we had to work with the available variables, it did not give us the flexibility to obtain all information we needed. Consequently, we had to assume that the variables used represented the three dimensions identified (performance risk, financial risk and convenience), which was not necessarily the case. However, if the author had formulated the research design, other variables could have been used. For instance, we would suggest, intuitively,

that variables like product availability and time pressure could be more representative of convenience than ease of cancelling orders.

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| Type of perceived risk | Questions | Dependent Variables | Scale |
|---------------------------|--|--|---|
| Financial risk | Evaluate the following statement, comparing WWW vendors and traditional vendors. a) It is just as safe to use credit card when making purchases from WWW. b) WWW vendors offer better prices | a) Security b) Price | From (1) strongly disagree to (5) strongly agree |
| Convenience/Time | Evaluate the following statement, comparing WWW vendors and traditional vendors. a) WWW vendors offer more useful information about the choices available b) It is easier to place orders with WWW vendors c) It is easier to cancel orders placed with WWW vendors d) It is easier to contact WWW vendors | a) Usefulness of Information b) Ease of placing orders c) Ease of cancelling orders d) Availability | From (1) strongly disagree to (5) strongly agree |
| Performance risk | a) On average, how often do you browse the product or service offerings of Web-based vendors, but without an immediate intent to buy? b) On average, how often do you search for information from Web-based vendors about products or services you have an intention to buy at some point in the near future? | a) Browse b) Search | (1) Don't do at all (2) Do less than one each month (3) Do about once each month (4) Do several times each month (5) Do about once each week (6) Do several times each week (7) Do at least once each day |
| | c) Skill Level | c) Skill Level | (1) Novice (2) Intermediate (3) Experienced (4) Expert |

Appendix 1: Measures of types of perceived risk