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Abstract

In this empirical study, variables that discriminate between consumers who search online but buy offline and consumers who search and buy online using Internet and the World Wide Web are identified using the innovation diffusion framework. Results show that, across eight product categories, mainly two variables discriminate between the two groups of consumers: self-assessed skill level and perceived transaction security.

Introduction

Since the introduction of the World Wide Web (WWW), an increasing numbers of consumers use this distribution channel to search information about products and services. However, of these consumers, only a limited (but growing) number actually buy online. The main objective of this research is to identify variables that discriminate between consumers who search online but buy offline and consumers who search and buy online. In order to identify these variables, the diffusion theory framework is utilized. Once identified, these variables are empirically tested in order to assess their ability to discriminate between these two groups of Internet users.

Review of the literature

Decision-making process

In consumer research, the classical consumer decision-making process consists of five distinct stages: problem recognition, information search, evaluation of alternatives, purchase decision and post-purchase behavior (Engel et al., 1973; Howard and Sheth, 1972). As mentioned, this study is interested in identifying variables that prevent consumers from completing the whole decision-making process online. Particularly, it focuses on consumers that achieve the information search and/or the evaluation stages online but for some reasons, instead of buying online, they decide to buy from a traditional (physical world) retailer.

Diffusion Theory

Since Internet and the WWW form a new distribution channel that consumers can use to buy products and services, it seems appropriate to review the innovation adoption process literature in order to identify the adopters' personal characteristics of a technological innovation such as the WWW.

The innovation diffusion theory originated in rural sociology (Rogers, 1983) and has been applied to various fields before being introduced to the consumer behavior area in the mid 1960s (Gatignon and Robertson, 1985). In order to explain the rate of adoption of an innovation, the diffusion theory focuses mainly on the adopters of innovation and the innovation itself. Since the objective of this research is directed towards consumer behavior, we will limit our review to the innovation adopter characteristics.

In their review of the work done by Robertson and Rogers comprising medical, farming and industrial innovations, Robertson and colleagues identified some variables that usually characterize innovators (Robertson, 1971; Robertson et al., 1984; Rogers, 1983). They found that innovators usually can be identified with personality characteristics such as a favorable attitude towards risk. In addition, Gatignon and Robertson mentioned that the speed of diffusion of a technological innovation is increased when consumers have innovation related knowledge and experience (Gatignon and Robertson, 1985). For example, Dickerson and Gentry found that adopters of home computers had more experience with related technical products such as programmable pocket calculator and video TV games than non-adopters (Dickerson and Gentry, 1983).

In summary, the innovation diffusion theory suggests that innovation adopters possess characteristics such as favorable attitude towards risk, experience with related products and knowledge about the product class. In the next sections, these variables will be reviewed within the context of online consumer behavior.

Perceived risk and online consumer behavior

First introduced by Bauer (1960) to the marketing discipline, perceived risk can be conceptualized as "*the amount that would be lost if the consequences of an act were not favourable, and the individual's subjective feeling of certainty that the consequences will be unfavourable*" (Cunningham, 1967).

Jacoby and Kaplan suggested five distinct risk dimensions (financial, performance, psychological, physical and social) that explained, in their study of 12

different products, 61.5% of the total variance in the overall risk construct (Jacoby and Kaplan, 1972). Furthermore, Stone and Gronhaug, using the five dimensions of Jacoby and Kaplan and time loss as a sixth dimension of perceived risk (Roselius, 1971), found that these dimensions explained 88.8% of the overall risk construct in their study of future purchase of home computer (Stone and Gronhaug, 1993; Jacoby and Kaplan, 1972). For that particular product, they found that the financial risk was the most predominant dimension of the overall risk.

One of the most often discussed consumers' perceived risk of using Internet and the WWW as a distribution channel is the security of online transactions (Fram and Grady, 1995; Gupta and Chatterjee, 1997; Minahan, 1997; Olson, 1999). Based on these observations, the financial dimension of perceived risk seems to be greater than any other perceived risk's dimensions. This may be because consumers are not only worried about the financial risk of buying a particular product online but moreover because they fear that their financial information (For example, credit card number) will be accessed and used without their consent. Therefore, it can be argued that the financial dimension is the most important dimension of the perceived risk when consumers decide not to buy online and specifically, that online transaction security perception will discriminate between consumers that search online but buy offline and consumers that search and buy online.

H1: The online transaction security perception will discriminate between consumers who search online but buy offline and consumers who search and buy online.

In order to reduce their perceived risk to an acceptable level, consumers may engage in risk reduction activities. As suggested by Cox and Rich, consumers have essentially two means of risk reduction, relying on past experience or acquiring new information (Cox and Rich, 1964). For example, Van den Poel and Leunis, in a study on perceived risk of mail-order buying, found that consumers used strategies such as consulting consumer organization ratings, seeking word-of-mouth information and being loyal to well known products in order to reduce their perceived financial risk (Van den Poel and Leunis, 1996).

Experience and Knowledge as Risk Reduction Devices

In consumer research, the concepts of experience, expertise, familiarity, and knowledge have often been used interchangeably (Beattie, 1982; Bettman and Park, 1980; Johnson and Russo, 1984). For example, Bettman and Park used the consumer's past experience as a proxy for product knowledge (Bettman and Park, 1980). As mentioned by Selnes and Gronbaug, knowledge may be developed through information without experience and that increased experience do not necessarily lead to increase in knowledge (Selnes and Gronbaug, 1986). Furthermore, based on empirical results, researchers suggested that knowledge and experience should be considered as different but related constructs (Nantel et al., 1990; Zaichkowsky, 1985).

Based on the perceived risk reduction approach, consumers who have greater experience of Internet and the WWW should perceived a lower risk of using this distribution channel to purchase products and services. In addition, based on the innovation diffusion theory, consumers who are heavy users of related products are usually more innovative. Furthermore, researchers found that consumers who buy on Internet are frequent WWW users (Hoffman et al., 1996; Van den Poel and Leunis, 1999). Since activities such as browsing the WWW and searching information about specific products and services on the WWW can be considered related to experiencing a purchase on Internet and the WWW, it is argued that the frequency of use of the WWW for browsing and the frequency of searching information on specific products or services will differentiate between consumers who search and buy online and consumers who search online but buy offline.

H2a: The frequency of browsing on the WWW will discriminate between consumers that search online but buy offline and consumers that search and buy online.

H2b: The frequency of searching product or service related information on the WWW will discriminate between consumers that search online but buy offline and consumers that search and buy online.

The risk reduction approach also suggest that consumers having greater knowledge of Internet and the WWW should perceive less risk in using this distribution channel. In consumer research, knowledge has been assessed by objective (how much a person knows about a product) and subjective (how much a person thinks s/he knows about a product) measures (Selnes and Gronhaub, 1986). Cox suggested that the greater the level of perceived knowledge about a specific product class, the lower the perceived level of risk and cognitive conflict associated with the buying decision (Cox, 1967). Furthermore, according to Selnes and Gronhaub, objective measures of knowledge should be used when research is preoccupied with ability differences among subjects and subjective measures should be used when it is interested in finding motivational aspects of subjects' behaviors (Selnes and Gronhaub, 1986). Since the latter reflects the research objective, this study will use a subjective measure of knowledge in order to assess the perceived knowledge of consumers about Internet and the WWW.

It is argued that consumers' perceived skill level of Internet and the WWW will differentiate between consumers who search and buy online and consumers who search online but buy offline. Therefore, the following hypothesis is posited.

H3: Consumers' perceived skill level of Internet and the WWW will discriminate between consumers who search and buy online and consumers who search online but buy offline.

Methodology

In order to test the posited hypotheses, data from the Graphic, Visualization, and Usability Center (GVU) 10th WWW User Survey were used. The survey was run on the WWW from October 1998 through December 1998. Respondents were asked to complete one or more of the nine online questionnaires. Within the survey period, 645 respondents completed the "Finding Product Information and Purchasing Questionnaire". Since the survey uses non-probabilistic sampling and is based on self-selection, the respondents may not represent the WWW population. However, it should be noted that since the WWW does not provide a centralized registry of all users in order to use random sampling methods and that online buyers still represent a small portion of the overall population, online surveys are commonly used to conduct research of online buying behaviors (Bellman et al., 1999; Van den Poel and Leunis, 1999). In order to minimize the possible sampling bias, the GVU survey was advertised on different websites (newsgroups, high-exposure sites, advertising networks and traditional media such as newspapers or trade magazines). The research sample was composed of a majority of male respondents (68,1%), which is similar to results obtained by other Internet surveys (Fram and Grady, 1998), and the majority of respondents (65,0%) were from the 26 to 50 age group.

In one section of the "Finding Product Information and Purchasing Questionnaire", respondents were asked to indicate for eight different product categories (See Table 1) if they usually search information online or offline and if, in the last six months, they bought products in these categories and if they did so online or offline. In order to measure the perceived risk related to online transaction security, respondents were asked to compare traditional vendors and WWW vendors according to the safety of using credit card on the WWW. The measure used was a one-item question with a five point Likert-type scale ranging form "Strongly disagree" to "Strongly agree". The frequency of browsing the WWW was assessed with a one-item question using a seven point Likert-type scale ranging from "Don't do at all" to "Do at least once each day". Frequency of searching information on specific products or services used the same measurement scale as the frequency of browsing variable. Finally, respondents were asked to self-assess their skill level (novice, intermediate, experienced or expert) on a one-item ordinal scale.

Results

In order to test the posited hypotheses and to assess the predictive ability of these variables as a whole, stepwise discriminant analyses (in which the variable that maximizes the Mahalonobis distance between the groups is utilized) were performed for each of the eight product categories. All functions significantly discriminated between consumers who search online but buy offline and consumers who search and buy online (See Table 1). Furthermore, Box M test results confirmed the equality of covariance matrices. For each product category, samples were divided in two subgroups. As illustrated in Table 2, two-third of respondents were randomly assigned to a calibration sample in order to generate the discriminant functions and the remaining respondents' data (validation sample) were used to test the goodness of fit of the discriminant functions.

Hypothesis 1

As posited in Hypothesis 1, perceived online transaction security discriminates between consumers who search and buy online and consumers who search online but buy offline. The only exception is for the investment product category. As shown in Table 2, for seven of the eight product categories, the online perceived transaction security discriminates between the two groups of consumers. Therefore, results show strong support for Hypothesis 1.

Hypothesis 2

Results of the eight discriminant functions do not support Hypothesis 2a (See Table 2). The frequency of browsing do not discriminate between consumers who search online but buy offline and consumers who search online and buy offline. However, the frequency of searching information online about products and services do discriminate between the two groups of consumers for half of the product categories. Interestingly, these four categories are related to computer products. Therefore, results show partial support for Hypothesis 2b.

Hypothesis 3

As posited in Hypothesis 3, the consumers' self-assessed skill level do discriminate between the two groups of consumers. As illustrated in Table 2, the skill level discriminates across all eight product categories, providing strong support to Hypothesis 3.

Table 1: Discriminant function significance

	CH<50$	CH>50$	CS<50$	CS>50$	Invest.	Music	Books	Travel
X^2	33.5	33.6	52.0	29.2	4.1	12.1	24.2	15.7
df	3	3	3	3	1	2	2	2
p	< 0.001	< 0.001	< 0.001	< 0.001	< 0.05	< 0.005	< 0.001	< 0.001
N Buyers	112	125	90	109	27	80	81	51
N Non-Buyers	147	191	222	179	90	170	208	185
N Total	259	316	312	288	117	250	289	236

Notes: CH: Computer Hardware, CS: Computer Software, Invest.: Investments (Stocks), Music: CDs, Tapes, Albums, Books: Books, Magazines, Travel: Travel Arrangements

Overall ability to predict online buying

The discriminant functions ability to correctly classify respondents varies across product categories. Based on the validation sample results, the highest correct classification (70,5%) is achieved for the "Computer Software > 50$" category and the lowest is achieved for the "Music" category (58,5%). Therefore, for some products, the consumers personal characteristics have a relatively high predictive power and for some other, results show that other variables are needed to correctly classify a larger portion of respondents.

Discussion

The results show that, across almost all product categories, two variables discriminate between consumers who search online but buy offline and consumers who buy and search online: Perceived transaction security related to credit card use and self-assessed skill level.

Interestingly, a third variable (frequency of searching products and services related information) discriminate between the two groups of consumers for computer related products. It can be argued that consumers of computer products are significantly different than consumers of other products or services (Investment, music, books and travel). In order to test this assumption, we divided our sample in two groups: computer product buyers and non-computer product buyers and compared the two groups performing an ANOVA on skill, security and frequency of searching information about products and services. Results show that consumers who buy computer products online perceive a higher level of transaction security ($F=53,044$; $p<0,001$), search online more frequently ($F=31,959$; $p<0,001$) and are more skillful ($F=85,872$; $p<0,001$) providing support to our assumption.

The only hypothesis that has not found support is Hypothesis 2a. The frequency of browsing without the intent to buy do no discriminate between consumers who search online but buy offline and consumers who buy and search online. Similarly to socio-demographic variables, that do not predict between online buyers behaviors (Bellman et al., 1999), it is suggested that the penetration of the WWW is now such that browsing has become a common activity for many consumers and it does not discriminate anymore between these two groups.

Managerial Implications

These findings have implications for WWW marketers. First, since security is still a major barrier to complete the decision-making process online, it is recommended that WWW marketers continue and increase their efforts to change the consumers' perceptions. Even though online security issues should be solved in the near future with technological advances (cryptography, smart cards, e-cash, etc.), WWW marketers should be aware that the perception of consumers may not evolve as fast as technology and that overcoming technological issues is necessary but not sufficient to ensure the growth of Internet and the WWW as a distribution channel (Jarvenpaa and Todd, 1997). As suggested by McGaughey and Mason, building a community of consumers could decrease the perceived risk of potential consumers by giving them the opportunity to communicate with satisfied consumers (McGaughey and Mason, 1998).

Second, in order to increase the perceived skill level of consumers, WWW marketers must first attract consumers to their site and than convince them to complete their first online transaction. After the completion of one successful transaction, it is suggested that consumers will perceived themselves as more skillful and will have greater confidence and therefore will perceive less risk to conduct online transactions in the future. WWW marketers must find ways to complete that important first transaction. It is suggested that one promising avenue is to link websites with call centres in

Table 2: Discriminant function coefficients and classification scores

	CH<50$	CH>50$	CS<50$	CS>50$	Invest.	Music	Books	Travel
Skill	**0.705**[a]	**0.732**[a]	**0.659**[a]	**0.692**[a]	**1.000**[a]	**0.749**[a]	**0.682a**	**0.797**[a]
Security	**0.670**[a]	**0.559**[a]	**0.602a**	**0.599**[a]	0.123	**0.742**[a]	**0.822**[a]	**0.730**[a]
Search	**0.508**[a]	**0.608**[a]	**0.620**[a]	**0.594**[a]	0.212	0.132	0.113	0.125
Browse	0.259	0.319	0.360	0.322	0.243	0.081	0.094	0.114
C.S. Class.	68.0%	65.8%	71.5%	66.3%	71.8%	59.6%	64.0%	66.1%
V.S. Class.	61.2% (N=139)	66.2% (N=142)	63.6% (N=162)	70.5% (N=139)	67.4% (N=43)	58.8% (N=136)	63.2% (N=155)	60.8% (N=120)

Notes: CH: Computer Hardware, CS: Computer Software, Invest.: Investments (Stocks), Music: CDs, Tapes, Albums, Books: Books, Magazines, Travel: Travel Arrangements.
C.S. Class.: Calibration Sample Correct Classification.
V.S. Class.: Validation Sample Correct Classification.
[a] Included in the stepwise discriminant function.

order to help consumers navigate through the site and complete online transactions.

Limitations and Research Avenues

This research has investigated only some of the personal characteristics of innovation adopters. Other characteristics such as social participation, opinion leadership, propensity to use mass media information, propensity to seek information outside the immediate social system (Gatignon and Robertson, 1985) have been identified in the innovation diffusion literature that may be of interest in order to explain the online behavior of consumers. Moreover, the innovation diffusion theory also suggests that the rate of adoption of an innovation does not only rely on the adopters' characteristics but also on the innovation relative advantage, compatibility, complexity, triability and observability (Rogers, 1983). Hence, this framework could be used to analyze Internet and the WWW. Furthermore, these additional personal and innovation characteristics could be used to increase the discriminant ability of our findings.

Finally, it should be noted that even if the results provide interesting insights of WWW consumers' behaviors, the non-probabilistic sampling technique and the self-selection of respondents used for this survey prevent generalization of these results to the entire WWW population. More research using probabilistic sampling techniques are needed to generalize these findings.

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