Drivers and Inhibitors to E-commerce Adoption: Exploring the Rationality of Consumer Behavior in the Electronic Marketplace

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Abstract

This research reports on the findings of a mail consumer survey conducted in Finland to (i) build an understanding of the rationales for adopting or rejecting the Internet and e-commerce by consumers, and to (ii) explore the relationship between e-commerce adoption decisions and perceived channel value, seen as the balance of power between the overall benefits that are likely to accrue by using the Internet, and the overall barriers encountered to using it or to deriving the sought benefits. Identifying the primary drivers and inhibitors to Internet and e-commerce adoption, and showing that e-commerce adoption/rejection is based on rational consumer behavior when seen from the proposed value perspective, the study contributes to and extends our understanding of the Internet as a medium for commercial use in the B2C arena.

Keywords

E-commerce, benefits, barriers, adoption, consumer behaviour, survey

Introduction

Although showing a rapid and continuing growth, the volume of business-to-consumer (B2C) e-commerce has not been able to meet the predictions from the mid-1990s, when many experts envisaged that this sector of e-commerce was set for an explosive growth and that the commercial use of the Internet would revolutionize trade by the new millennium. With many companies today reevaluating, revising, or even terminating their more or less failed Internet strategies while others still contemplate entering the electronic marketplace, a highly relevant question is: Why do consumers embrace - or refuse to embrace the Internet as a commercial medium

In the early years of the commercial Internet, characterized by a widespread optimism, yet inconsistent predictions and scenarios based on anecdotal rather than empirical evidence, many Internet ventures and investments were, to a great extent, based on pure instinct and tenuous justifications. Similarly, the decision-making in e-businesses not infrequently reflected a ‘technocist focus’ rather than a customer orientation - a fact that partly explains why many ambitious start-up Internet projects have collapsed in the recent years. The key to an organization’s marketing orientation lies in its understanding of how its potential clients make decisions to spend their resources of time, money and effort, and of the benefits they seek from so doing (Laws 1991). However, on the Web product marketing and sales merge to create a unique marketplace that challenges our traditional ways of analyzing buying behavior (Zellweger 1997). Because electronic channels still are in very early stages of development,

little is known about consumer attitudes toward adopting or not adopting electronic media and the factors that influence consumers' attitudes about them (Eastlick & Lotz 1999, Rowley 2000, Amit & Zott 2001, Han & Han 2001, Venkatesh & Brown 2001, Parsons 2002). According to Vijayasarathy and Jones (2000b), academic studies that investigate ways to predict individual purchase behavior via the Internet would seem to offer much to the discipline. Nevertheless, while a number of authors have examined factors that may influence shopping on the Internet, much of this research is primarily conceptual in nature (Swaminathan *et al.* 1999).

With the basis in the fundamental research question: *what are the reasons for consumer adoption/non-adoption of e-commerce?*, this research sets out to build an understanding of the primary drivers and inhibitors to e-commerce adoption, and to explore whether *perceived customer value* is a relevant construct in terms of explaining consumers' e-commerce adoption decisions. To accomplish these aims, we draw on primary data collected through a consumer survey in Finland, one of the technologically most advanced countries in the world.

Theoretical Foundations and Previous Research

One of the basic assumptions that economists make about consumer choice is that individual consumers behave rationally, making choices best suited to their goals, budget constraints, and earning power and are primarily interested in *value* maximization (Josiam & Hobson 1995). In the marketing literature, many studies have proposed or verified that *perceived customer value*[1] is a salient determinant of consumers' purchase intentions and purchase decision making (see e.g. Zeithaml 1988, McDougall & Levesque 2000), and in understanding consumer behavior (see Parasuraman 1997). While value considerations typically have been associated with the overall pre-purchase assessment of the utility of a product, we argue that the core idea of the concept is equally relevant as we examine the relative advantages of technological innovations, commercial media, or even electronic distribution channels (cf. Anckar & D'Incau 2002, Han & Han 2001). In this context we argue, however, that the traditional view of the value equation as a tradeoff between benefits (or just quality) and *costs* is too simplistic in terms of building an understanding of the primary motivators and inhibitors to e-commerce adoption. Instead, the value concept should be interpreted as the trade-off between get and give components described not only in monetary terms, but seen from a much broader perspective, addressing non-monetary sacrifices as well (cf. Jensen 2001, Sweeney & Soutar 2001, Eggert & Ulaga 2002). Accordingly, a basic proposition of this research is that consumers, acting rationally, make their channel adoption/rejection decisions based on their *perceived channel net value*, which is seen as the tradeoff between the overall *benefits* that are likely to accrue by using electronic channels in comparison to existing alternatives (traditional channels), and the overall *barriers* encountered to using them or to deriving the sought benefits

The Internet and e-commerce have been seen to bring consumers a great number of potential benefits in comparison to physical channels, most of which have been widely cited in the academic literature and the popular press - especially in the early years of e-commerce. Likewise, many potential barriers to consumer adoption of the Internet and e-commerce have been identified in a significant body of literature. In spite of this wide attention, and the width

[1] Broadly defined as the results or benefits customers receive in relation to total costs (McDougall & Levesque 2000), i.e. a customer's overall assessment of the utility of a product (or service) based on perceptions of what is received and what is given (Zeithaml, 1988).

of anecdotal evidence for certain benefits/barriers being more significant than others, surprisingly little empirical research has been conducted on these important subject matters within the academic research sector. Presenting evidence that social influences play a key role in household adoption of PCs, and that rejection decisions are based on some critical barriers (rapid change in technology, high costs, and lack of knowledge), Venkatesh and Brown (2001) argue that the factors that are influential in adoption, non-adoption, and use of household PCs should provide insights into adoption and non-adoption of e-commerce, and call for future research to determine if the same factors influence Internet usage and participation in e-commerce activities. Furthermore, the authors argue that research is necessary to identify the barriers that keep consumers from joining the e-commerce market, hypothesizing that download delays, search problems, and security issues are possible impediments (Venkatesh & Brown 2001).

A number of important empirical contributions relating to the reasons for consumer e-commerce adoption and/or benefit/barrier perceptions have been reported: In a small-scale survey Kangis and Rankin (1996) found that the perceived benefits and disadvantages of interactive services differ across product categories, whereas Katz and Aspen (1997) investigated the motivations for and barriers to Internet usage in a US-based survey conducted in 1995. The study was not, however, specifically related to *commercial* use of Internet by consumers, and at the time of the study only 8% of the respondents were Internet users. An online survey similar in orientation was conducted in Singapore by Teo *et al.* (1999), who drew on the widely recognized and used technology acceptance model (TAM) by Davis (1989) to find that perceived usefulness is generally more important than perceived ease of use and perceived enjoyment in affecting Internet usage. Similarly, Fenech and O'Cass (2001) found that attitude and perceived usefulness do predict adoption of the Web for retail usage.

Jarvenpaa and Todd (1996-1997) identified a number of factors that consumers found salient as they browsed through selected Web malls, but the chosen approach meant that their findings (i) were related to the consumers' experience with some specific Web sites, and (ii) did not cover perceptions by Internet non-adopters. Other studies have focused more on the customer characteristics that influence consumers' propensity to engage in e-commerce (see e.g. Eastlick & Lotz 1999, Citrin *et al.* 2000). Swaminathan *et al.* (1999) presented empirical results suggesting that consumers who are primarily motivated by convenience are more likely to make purchases online, and that those who value social interactions are less interested in e-shopping. Li *et al.* (1999) found that education, convenience orientation, experience orientation, channel knowledge, perceived distribution utility, and perceived accessibility are robust predictors of whether and how frequently Internet users make purchases online. The two last-mentioned studies were conducted among Internet users, hence excluding the perceptions of Internet non-adopters. In addition, many single-dimensional empirical studies (which investigate the effect of only one specific advantage or disadvantage) have been reported (e.g. Furnell & Karweni 1999, Udo 2001). Such studies do not, however, allow us to draw any conclusions on the *relative* importance of different motivators and inhibitors to e-commerce adoption.

E-Commerce Benefits and Barriers to Consumers

The e-commerce literature has identified and extensively discussed, especially in the early years of the commercial Internet, a large number of consumer motivators and impediments to e-commerce. In Tables 1 and 2 we have listed and briefly explained the most commonly proposed factors, which are also subject of empirical investigation in the study reported here.

Benefits
***Accessibility and convenience*.** The possibility to shop anytime, from anywhere is the most obvious and most commonly cited advantage of e-commerce, and was found to be the most important perceived consumer benefit of Internet shopping in empirical studies by Jarvenpaa and Todd (1996-1997) and Kangis and Rankin (1996).
Global choice. Since the boundaries of e-commerce are not defined by geography or national borders, consumers will benefit from a wide selection of vendors and products - including a wider availability of hard-to-find products (Benjamin & Wigand 1995, Hoffman *et al.* 1995, Alba *et al.* 1997).
***Online delivery*.** For digital products, the whole commercial cycle, including distribution, can be conducted via a network, providing instant access to products immediately when a need arises.
Test and trial online. Digital products can be tested over the Internet prior to making purchase decisions, reducing uncertainty.
The real-time nature of the medium. The Internet can provide consumers with up-to-the minute information on prices, availability, etc. (cf. Franz 2000).
Time savings. Consumers may benefit from the shopping process being faster in the marketspace than in the marketplace as a result of the rapidity of the search process and the transactions (Wigand & Benjamin 1995, Krause 1998).
Possibilities for comparison shopping. By allowing consumers to shop in many places and conduct quick comparisons of offerings and prices (Hoffman *et al.* 1995, Hart *et al.* 2000), Internet marketplaces have the ability to reduce search costs for price and product information (Bakos 1998, Strader & Shaw 1999, Rowley 2000, Bhatt & Emdad 2001).
Access to extensive information. An important consumer benefit is the access to greater amounts of dynamic information to support queries for consumer decision-making (Hoffman *et al.* 1995, Alba *et al.* 1997).
Privacy and anonymity. The Internet has the potential to offer consumers benefits with respect to a partial, or even a total privacy and anonymity/pseudonymity (Parsons 2002) throughout the purchasing process.
Competitive prices. By embracing e-commerce consumers may benefit from price reductions as a result of increased competition as more suppliers are able to compete in an electronically open marketplace (Turban *et al.* 1999), as a result of reduced selling prices due to a reduction in operational/transaction costs (Brynjolfsson & Smith 2000), and manufacturers internalizing activities traditionally performed by intermediaries (Benjamin & Wigand 1995).
Availability of personalized offerings. Consumers can benefit from IT-enabled opportunities for *personalized interactions* and one-to-one relationships with companies, which allow for products, services and Web content to be customized more easily (cf. Peppers & Rogers 1999, Brown 2000).
The asocial nature of the purchasing process. Since consumers differ in their social disposition, many customers may find an impersonal purchasing situation desirable for asocial reasons or simply because they find the verbal contact with a seller time-consuming. Moreover, the lack of physical sellers creates a sales setting where there is virtually no pressure to buy (Zellweger 1997).

Table 1. A summary of the main potential drivers for consumer adoption of e-commerce

BARRIERS
Quality evaluation. On the Internet, it is more or less impossible to make sure, beyond doubt, that (tangible) products have the desired features (e.g. design, material, color, fit), giving rise to a *quality evaluation barrier* to e-commerce. Empirical findings by Kangis and Rankin (1996) showed that the need to feel and touch was the dominating disadvantage for all home-shopping services.
Security risks. It has been suggested that *transaction security* (such as the credit card number being picked up by third-party hackers) is mostly a perceptual problem in e-commerce (Rose *et al.* 1999). Nevertheless, the fact remains that it may be one of the more complex barriers to be overcome (Zwass 1996, Alridge *et al.* 1997, Reedy *et al.* 2000), as studies show that adopters as well as non-adopters of Internet shopping have security worries (Furnell & Karweni 1999, Udo 2001, Fenech & O'Cass 2001).
Lack of trust in virtual sellers. The *fear of fraud and risk of loss* has commonly been cited as a significant barrier to B2C e-commerce, with empirical research findings supporting this assumption (see Jarvenpaa & Todd 1996-1997, Furnell & Karweni 1999, Hoffman *et al.* 1999, Vijayasarathy & Jones 2000a).
Delivery times. In tangible product categories, any home-shopping method involves delivery times which means that the Internet is at a disadvantage to physical stores as it fails to meet the customers' need for instant gratification (Vassos 1996). Consumers may thus be reluctant to wait for the delivery of ordered goods for days/weeks if the same product can be collected immediately in physical outlets.
Lack of personal service. While e-commerce offers great opportunities for one-to-one marketing, it significantly reduces, or even puts an end to the *personal service* (human-to-human contact) characterizing traditional commerce. This may, as suggested by research by Kangis & Rankin (1996), be an impediment to e-commerce for many consumers.
Lack of enjoyment in shopping. Many consumers find the shopping experience - looking, feeling, comparing - in retail stores relaxing and enjoyable [see Jones (1999) for a literature review]. As the feeling of amusement and relaxation is unlikely to be as marked in electronic settings, e-shopping can hardly be seen as a substitute for the leisure experience associated with conventional shopping (Phau & Poon 2000).
Hard to find what you are looking for. The difficulty to locate stores/products/information on the Web (cf. Jarvenpaa & Todd 1996-1997, Rose *et al.* 1999) emerges from limitations of the user, search engines used, or poor site usability.
Time-consuming nature. As noted, e-commerce may offer consumers *savings in time*. In practice, however, using the Internet for commercial purposes may prove to be too time consuming for many users (see Anckar & Walden 2002). There are multiple reasons for this: (i) difficulties locating Web sites/products/services (Hofacker 2001); (ii) registration procedures required to access services; and (iii) making price comparisons (cf. Reedy *et al.* 2000).
Cost of entry. Cost of acquiring a computer, etc.
Cost of use. Internet access fees.
Limited Internet/ computer experience. Reluctance/difficulties operating computers and/or browsing the Web.
Poor connection speed. Due to low bandwidth connections, using the Internet may be time-consuming, and thus frustrating.

Table 2. A summary of the main potential inhibitors to consumer adoption of e-commerce

Aims, Propositions and Research Questions

In the discussion above, a call for further empirical studies focusing on the antecedents of consumer adoption or non-adoption of e-commerce was made. Typically, empirical research findings relating to consumer perceptions of benefits of and barriers to e-commerce are (i) *outdated* (due to technological advances, improved Web services, and significantly increased Internet and e-commerce adoption in the last few years), (ii) representative only for *certain geographic markets*[2]; and (iii) based on *small-scale, exploratory* studies - typically *online surveys*, meaning that the views of Internet non-adopters are not represented[3]. Moreover, (iv) e-commerce encompasses (as the concept generally is defined) both transactional and non-transactional dimensions, and therefore we need to distinguish between different *levels of e-commerce adoption* as we analyze consumer decisions relating to electronic channels. Furthermore, (v) since most studies on consumer advantages of and impediments to e-commerce have explored the impact of only one or a few variables (which are often not consistent with the benefits/barriers as cited in the e-commerce literature), little is known about the *relative* importance of different benefits of and barriers to e-commerce. Similarly, (vi) it can be discussed whether TAM-based studies provide sufficient explanatory power in terms of consumers' decisions to choose certain commercial channels over others (for certain tasks and in certain situations) due to the general and abstract - albeit relevant - constructs the model encompasses.

In order to accomplish our research objectives, which are (i) to explore the relationship between e-commerce adoption and consumer perceived channel net value, and (ii) to build an understanding of the primary drivers and inhibitors to e-commerce adoption, different consumer groups in terms of Internet and e-commerce adoption had, by necessity, to be investigated and compared. Hence, an online data collection procedure was not an option given our aims, and instead a mail survey was conducted to target different consumer groups in terms of their *level of experience* with electronic media. Accordingly, the following two dimensions of consumer e-commerce adoption were drawn on in this study: (i) *Internet adoption, and* (ii) *adoption of transaction-based e-commerce* (TEC). The corresponding subsamples were operationalized as follows:

- *Internet non-adopters*: respondents who have never used the Internet. Their statements on the issues subject of investigation are thus conjectural and/or based on secondary opinions.
- *Internet adopters*: respondents using the Internet regularly or occasionally. These consumers have experiences of the Internet (and likely of e-commerce in the pre-purchase phase), but not necessarily of online shopping. As Figure 1 depicts, this consumer group is further split into:
  - *TEC non-adopters:* Internet adopters who for some reason(s) have not embraced online shopping.
  - *TEC adopters*: Respondents who have made purchases on the Internet, and whose statements thus are founded on their experiences with online shopping.

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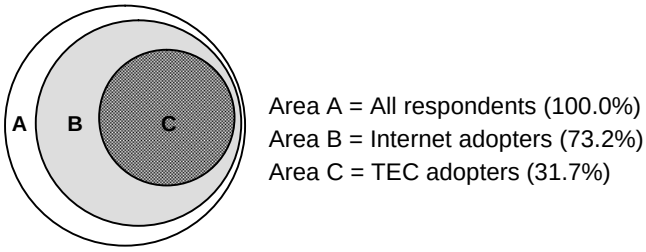
[2] No studies into antecedents of consumer adoption of e-commerce in the Nordic European countries have, for instance, been reported, although this constitutes a region with exceptionally high Internet adoption rates.

[3] This particular limitation in most research conducted on consumer adoption of Internet commerce is acknowledged by e.g. Fenech and O'Cass (2001), who call for future research that is "extended from those Internet users who have and have not adopted the Web for retailing, to examine those who have adopted the Web and those who have neither taken up the Internet nor see any future likelihood of doing so" (p. 374).



NOTE: The sizes of the areas (A-C) portray the relative sizes of the subsamples as observed in the survey reported here.

Figure 1. Adoption dimensions used in the study

While much has been written about consumer drivers and inhibitors to e-commerce, the academic research sector has not produced a sufficient theoretical basis for understanding the reasons for consumer adoption of electronic channels due to the aforementioned limitations or restricted focus of previous studies into these matters. Consequently, the research presented here is principally to be seen as exploratory in nature, and accordingly the empirical investigation is guided by two interrogative research questions

RQ$_1$ Are consumer Internet and e-commerce adoption decisions rational when seen from a *perceived channel net value* perspective?

Since we expect, following the basic assumption underlying this research[4], consumer channel adoption decisions to reflect rationality, this research question can be translated into the following propositions:

P$_1$: Internet adopters perceive the total benefits of e-commerce as exceeding the total impediments to embracing/using e-commerce (positive net value), whereas Internet non-adopters perceive the total barriers to embracing/using e-commerce as exceeding the total benefits of e-commerce (negative net value).

P$_2$*:* The perceived net value is higher for TEC adopters than for TEC non-adopters

RQ$_2$ Which value constituents (when seen as narrowly defined benefits/barriers as commonly mentioned in the e-commerce literature as well as more broadly defined motivator/inhibitor dimensions) constitute the primary factors influencing consumer Internet and EC adoption/rejection decisions?

Sample and Data Collection

To obtain a sample representative for the target population, defined as the Finnish population in the age 16-74 years, the electronic sampling frame provided by Finnish Population Register Centre was used to produce a sample of 1000 consumers based on a stratified sampling procedure. Because of the large size of the sampling frame, which includes the entire Finnish population (approximately 5.2 million inhabitants), the sample was drawn using a two-stage sampling method[5]. In the first stage, 15 municipalities - one city and two rural municipalities

[4] Stating, as noted above, that consumers' channel adoption/rejection decisions are based on their *perceived channel net value.*

[5] Due to hardware limitations, the sample provider was unable to make runs with a sampling frame exceeding 1

from each of the five Finnish counties were randomly selected, thus reducing the sampling frame to approximately 650.000 population elements. In the second stage, the sample was randomly drawn based on the relative population in the chosen municipalities, otherwise in line with the national demographic characteristics.

Data were collected using a non-interactive, self-administered questionnaire, which was mailed out to the consumers, with a second mailing to all non-respondents three weeks later. In order to increase the response rate and thereby minimize the risk for non-response bias, an attempt was made to motivate the respondents to complete and return the questionnaire by announcing the drawing of, among other things, a top-of-the line mobile phone among all respondents. 8 questionnaires were returned undelivered due to incorrect addresses. A total of 497 returns were received by the deadline. Of these, 485 questionnaires were usable, giving an effective response rate of 48.9%. The responding sample was manually checked for possible nonresponse error on a number of variables (gender; age group: area of residence; native language), as this was possible even with the anonymous survey design. In the questionnaire, the respondents were instructed to indicate how strongly they agree or disagree with a number of statements relating to their perceived importance/magnitude of different benefits of and barriers to Internet commerce. For this, a standard five-point Likert scale was used (5 = strongly agree, 1 = strongly disagree)[6].

Of the respondents, 208 (43.5%) were males, and 270 (56.5%) females. All age groups were represented in proportions corresponding well to the population demographics (cf. Väestörekisterikeskus 2000). Only 5.8% of the respondents reported that they did not know what the Internet is, and did therefore not complete the rest of the questionnaire. 46.7% were regular Internet users, 26.5% use it occasionally, and 12.3% had only tried. 7.2% had not yet tried, but reported that they were interested to. Another 7.2% had not yet tried, and had no intention to do so. 31.8% reported that hey had made purchases over the Internet. As many as 40.2% had not yet made any purchases, but were interested to, whereas 27.8% had no intention to embrace e-shopping. Comparing these figures to the findings from other (non-academic) studies (Suomen Gallup Web 2001, Taloustutkimus 2001), the sample appeared to be slightly skewed towards Internet adopters and TEC adopters.

Survey Findings

Perceived Importance of Drivers and Inhibitors

In terms of the importance/significance of the different drivers and inhibitors, our findings (see Table 3) were in line with the results of previous, related studies (Kangis & Rankin 1996, Jarvenpaa & Todd 1996-1997, Furnell & Karweni 1999) in the sense that *accessibility and convenience* was perceived as the single most important benefit by the respondents, with 79,6% agreeing or strongly agreeing to the statement that this was an important motivator for using the Internet for commercial purposes. As expected, the *security risks* were seen as a

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million inhabitants, outsourcing all requests for samples covering the entire Finnish population. Since this would have caused delays and increases in costs, a two-stage sampling method was chosen.

[6] Standardized Likert scales are commonly seen to have interval properties - an interpretation that allows the use of parametric statistical procedures. As noted by e.g. Moser and Kalton (1974), Likert scales are, even when treated as interval scales, fairly reliable in the sense of yielding reproducible results.

major impediment to embracing Internet commerce, but interestingly the *quality evaluation* barrier was seen as even more significant.

Variable	*N*	Mean	Median	SD	Agree[1]	Disagree[2]
BENEFIT: Accessibility and convenience	437	4.10	4.00	1.03	79.6%	7.8%
BENEFIT: Wide selection of vendors/products	437	3.81	4.00	1.04	67.4%	12.6%
BENEFIT: Online delivery	436	3.74	4.00	1.01	58.6%	8.0%
BENEFIT: The real-time nature of the medium	433	3.60	4.00	1.03	62.0%	16.2%
BENEFIT: Time savings	437	3.57	4.00	1.13	57.6%	18.1%
BENEFIT: Test and trial online	436	3.42	3.00	1.04	46.4%	14.5%
BENEFIT: Possibilities for comparison shopping	435	3.42	3.00	1.08	50.0%	20.3%
BENEFIT: Access to extensive information	436	3.20	3.00	.99	41.4%	23.9%
BENEFIT: Privacy and anonymity	437	3.04	3.00	1.23	40.4%	34.2%
BENEFIT: Competitive prices	432	3.01	3.00	.95	26.7%	24.6%
BENEFIT: Availability of personalized offerings	428	2.98	3.00	.94	26.2%	26.9%
BENEFIT: No social interaction	436	2.25	2.00	1.23	20.0%	67.1%
BARRIER: Quality evaluation	445	4.07	4.00	.92	82.9%	9.2%
BARRIER: Security risks	446	3.93	4.00	1.12	76.0%	14.8%
BARRIER: Lack of trust in virtual sellers	441	3.57	4.00	1.18	63.4%	20.6%
BARRIER: Delivery times	443	3.56	4.00	1.03	58.8%	17.9%
BARRIER: Lack of personal service	438	3.40	4.00	1.30	53.3%	28.8%
BARRIER: Lack of enjoyment in shopping	441	3.10	3.00	1.28	40.2%	36.4%
BARRIER: Cost of use	443	3.03	3.00	1.39	47.1%	43.2%
BARRIER: Hard to find what you are looking for	442	2.87	3.00	1.19	35.8%	42.2%
BARRIER: Cost of entry	444	2.85	2.00	1.54	43.8%	50.1%
BARRIER: Low bandwidth connections	430	2.69	3.00	1.31	29.1%	45.0%
BARRIER: Limited Internet/computer experience	442	2.42	2.00	1.44	29.7%	60.5%
BARRIER: Time-consuming nature	442	2.34	2.00	1.16	16.6%	59.6%

[1] Percentage of consumers who responded *strongly agree* (5) or *agree* (4)
[2] Percentage of consumers who responded *strongly disagree* (1) or *disagree* (2)

Table 3. Summary statistics for benefit/barrier variables

Rationality of Adoption Decisions

In order to investigate the plausibility of the propositions (P1, P2) relating to rationality of consumer channel choices, we computed the *aggregate mean (i) benefit* and (ii) *barrier value* (by combining the obtained scores for all the benefit and barrier variables subject of investigation) for the identified subsamples in terms of Internet and TEC adoption. The results, depicted in Figure 2, provide strong support for the relevance of net value perceptions in channel adoption decisions, and for the assumption of rationality of consumer behavior: The Internet non-adopters experienced negative perceived net value (gap: -0.57), whereas Internet adopters perceived positive net value (+0.36). Among the Internet adopters, the adopters of transaction-based e-commerce recognized a much higher perceived net value (+0.63) than the non-adopters (+0.19). Both propositions were thus supported.

Drivers/Inhibitors to E-commerce Adoption

In order to identify the primary drivers and inhibitors to consumer e-commerce adoption, *t*-tests were conducted to investigate whether there are significant variations in the perceived benefit and barrier intensity between Internet adopters and Internet non-adopters, as well as

between TEC adopters and TEC non-adopters. The results, presented in Tables 4 and 5, indicate significant differences between Internet adopters and non-adopters on three of the twelve proposed benefits, and on eight of the suggested impediments to e-commerce in addition to the *aggregate* barrier value. Significant differences were observed between TEC adopters and non-adopters on the benefit variables *accessibility and convenience*, *time savings,* and *availability of personalized offerings.* However, observing the mean values for the barriers, we found significant differences between Internet shoppers and non-shoppers on eight variables in addition to the aggregate barrier value. All the observed significant differences are based on adopters perceiving the proposed benefits to be more important, and respectively the proposed barriers to be less critical than the non-adopters.

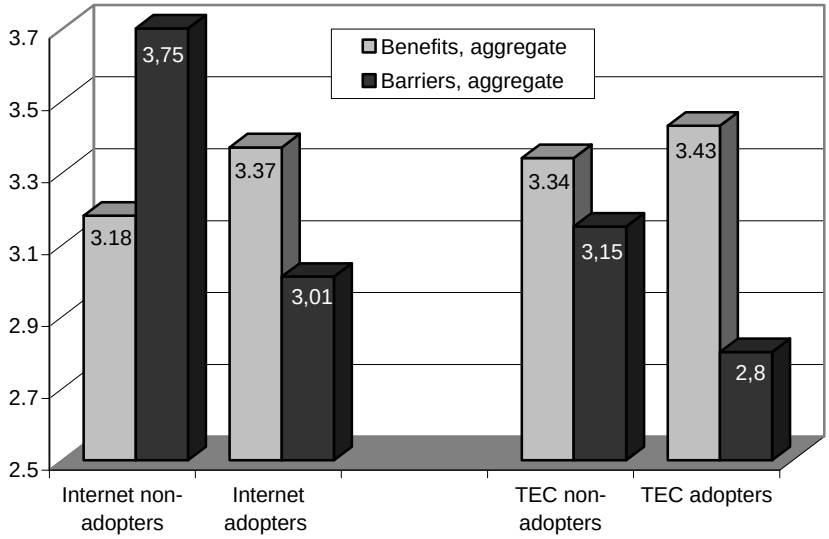

Figure 2. Perceived total benefits vs. barriers by subsamples

Benefit	Internet adopters	Internet non-adopters	*P*	TEC adopters	TEC non-adopters	*p*
Accessibility and convenience	4.22	3.50	.000*	4.47	4.04	.000*
Wide selection of vendors/products	3.83	3.59	.173	3.83	3.83	.997
Online delivery	3.89	3.15	.000*	3.83	3.93	.350
The real-time nature of the medium	3.67	3.40	.118	3.70	3.65	.648
Time savings	3.67	3.22	.021*	3.86	3.54	.006*
Test and trial online	3.45	3.29	.264	3.45	3.45	.995
Possibilities for comparison shopping	3.43	3.31	.533	3.43	3.44	.942
Access to extensive information	3.21	3.10	.505	3.28	3.16	.297
Privacy and anonymity	3.05	3.20	.390	3.00	3.09	.521
Competitive prices	3.03	2.98	.697	3.08	3.01	.530
Availability of personalized offerings	2.99	3.02	.848	3.12	2.91	.044*
No social interaction	2.23	2.37	.484	2.20	2.24	.742
Benefits, aggregate	3.37	3.18	.121	3.43	3.34	.186

N (Internet adopters) = 334 N (Internet non-adopters) = 49 N (TEC adopters) = 143 N (TEC non-adopters) = 291
* significant at the .05 probability level

Table 4. Perceived importance of benefits (mean values) by subsamples

Barrier	Internet adopters	Internet non-adopters	*p*	TEC adopters	TEC non-adopters	*p*
Quality evaluation	4.03	4.33	.028*	3.65	4.29	.000*
Security risks	3.92	3.95	.877	3.65	4.09	.000*
Lack of trust in virtual sellers	3.59	3.50	.671	3.24	3.83	.000*
Delivery times	3.49	3.72	.174	3.30	3.64	.003*
Lack of personal service	3.25	4.09	.000*	2.87	3.53	.000*
Lack of enjoyment in shopping	2.94	3.81	.000*	2.56	3.21	.000*
Cost of use	2.82	3.91	.000*	2.67	2.93	.093
Hard to find what you are looking for	2.80	3.13	.044*	2.59	2.94	.009*
Cost of entry	2.53	4.17	.000*	2.49	2.57	.615
Low bandwidth connections	2.64	2.88	.213	2.80	2.53	.074
Limited Internet/computer experience	1.97	4.23	.000*	1.67	2.20	.000*
Time-consuming nature	2.16	3.06	.000*	2.06	2.23	.171
Barriers, aggregate	3.01	3.75	.000*	2.80	3.15	.000*

N: Internet adopters = 334 Internet non-adopters = 49 TEC adopters = 143 TEC non-adopters = 291
* significant at the .05 probability level

Table 5. Perceived importance of barriers (mean values) by subsamples

Exploratory Factor Analysis

While the findings presented in Tables 4 and 5 provide us with valuable insight as to the benefits and barriers that play a main role in the consumer e-commerce adoption process, it remains unclear whether, and to what extent, individual benefits and barriers drive adoption or rejection decisions. From a consumer's mindset, value judgments and resulting adoption decisions may be based on more general, internal attributes that relate to some common underlying characteristics of the proposed benefits and barriers. An identification of such latent factors could provide us with more easily interpretable results and a greater understanding of the nature of the key drivers and inhibitors to e-commerce adoption.

Categorizing the Benefits

A variety of classification methods have been suggested and employed to examine the motivational determinants of (online) shopping, Internet use, or IT adoption in general: Building on the TAM, Davis *et al.* (1992), suggested that user intention to adopt IT is affected by both *extrinsic* and *intrinsic* motivations. Extrinsic motivation refers to the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, whereas intrinsic motivation refers to the performance of an activity for no apparent reinforcement other than the process of performing the activity per se (Davis *et al.* 1992). This classification method has been employed in the context of Internet usage by e.g. Teo *et al.* (1999). Peterson *et al.* (1997) contend that marketing activity occurs through three types of channels: *distribution, transaction,* and *communication* channels, which would suggest that the benefits arising from the use of the Internet could be categorized accordingly. In fact, Li *et al.* (1999) set out from Peterson *et al.*'s classification when they propose that channels vary in their utilities for consumers in terms of communication, distribution, and *accessibility,* defined as the degree to which time and effort are involved in using a channel. Eastlick and Feinberg (1999) examined motives of catalog shoppers based on Sheth's (1983) distinction between *functional* and *nonfunctional* motives,

where functional motives are related to tangible attributes, whereas nonfunctional motives are related to social and emotional needs and wants for interaction and communication with other people, and for enjoyable, interesting shopping experiences.

Since all the proposed typologies appear too broad to cover the variety of benefits of e-commerce, and since no empirically supported categorization can be drawn on regarding the variables subject of investigation, principal components factor analysis with varimax rotation was employed to empirically identify the main underlying dimensions in the benefit/barrier data. Using the Kaiser criterion (extracting factors with eigenvalue = 1), three factors were produced from the benefit variables. As they accounted for less than 57% of the variance, and since many variables showed strong secondary factor loadings, further runs specifying a larger number of factors were done. Retaining as many as 5 factors turned out to offer the most interpretable solution, accounting for 71.6% of the variance.

	FACTOR				
	1	2	3	4	5
Accessibility and convenience	**,859**	,147	,142	,113	,057
Time savings	**,755**	,069	,267	,140	,165
Wide (global) selection of vendors/products	**,601**	,504	,039	,254	-,037
Possibilities for comparison shopping	,164	**,773**	,177	,206	,051
Competitive prices	,112	**,771**	,246	-,007	,152
The real-time nature of the medium	,193	,125	**,844**	,089	,006
Access to extensive information	,155	,270	**,711**	,214	,166
Availability of personalized products/services	,164	,362	***,479***	,222	,322
Online delivery	,256	,072	,072	**,850**	,075
Online test and trial of products	,076	,174	,267	**,816**	,094
The asocial nature of the purchasing process	,051	-,026	,045	-,017	**,889**
Privacy and anonymity	,101	,237	,152	,186	**,730**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 6 iterations.
Italized variable = excluded from further analyses

Table 6. Rotated factor matrix for benefit variables

Table 6 depicts the loadings for each underlying variable of the retained five factors. Looking for patterns of similarity between the items that load on each factor, most relationships appeared logical: the factor distribution efficiency (F4) includes variables related to the Internet's distribution capabilities; privacy (F5) incorporates benefits related to the asocial sales setting; bargain hunting (F2) contain benefits related to finding low-priced products, whereas shopping efficiency (F1) features benefits that relate to the ubiquity of the Web and the resulting efficacy of online shopping. Only one factor, information efficiency (F3), was initially difficult to interpret as it incorporated the variable availability of personalized products/services, which intuitively would be expected to load on the factor shopping efficiency. The item was, however, dropped from further analysis on account of insufficient factor loading (.479) for a variable measured using a Likert scale[7].

[7] Only variables that loaded above .60 were considered to be a defining part of a factor, and were thus included in further analyses.

Categorizing the Barriers

Similarly as was the case when categorizing the benefit variables, the IS literature does not provide adequate theoretical (or empirically supported) perspectives that can be drawn on to propose a categorization of the barriers subject of investigation. Consequently, the *a priori* approach to developing the main underlying barrier dimensions was not seen as appropriate. Instead, we drew on an exploratory factor analysis also for the impediments, thereby establishing the factors *a posteriori*. For the barrier variables, the analysis retrieved 4 factors with eigenvalues greater than 1. As these factors accounted for a satisfactory 65% of the variation besides offering a highly interpretable solution, a four-class taxonomy was employed for the further investigations. Table 7 shows the rotated factor matrix, and the underlying variables of the extracted factors, which were named *shopping limitations* (F1), *cost* (F2), *financial risks* (F3), and *search problems* (F4).

	FACTOR			
	1	2	3	4
Lack of enjoyment in online shopping	**,785**	,089	,033	,176
Lack of personal service	**,745**	,092	,113	,189
Delivery times	**,612**	,058	,166	,003
Hard to assess quality	**,601**	-,040	,449	,074
Cost of use	,134	**,874**	,052	,072
Cost of entry	,194	**,829**	-,040	,081
Poor connection speed	-,149	**,651**	,202	,266
Lack of trust in virtual sellers	,157	,095	**,865**	,144
Security risks	,226	,079	**,838**	,058
Hard to locate find what you are looking for	,042	-,069	,324	**,778**
Time consuming nature	,127	,272	,046	**,751**
Limited proficiency	,311	,243	-,089	**,613**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 6 iterations.

Table 7. Rotated Component Matrix for barrier variables

In order to assess the relevance of the identified benefit and barrier factors in terms of consumer adoption decisions, factor scores were calculated for all respondents for each of the new factors, after which *t*-tests were conducted to investigate whether there are significant variations in the perceived benefit and barrier intensity between subsamples[8]. The results, shown in Table 8, clearly indicate that the factors *shopping efficiency* and *distribution efficiency* constitute the primary drivers for *Internet adoption*, a conclusion based on the facts that (i) they displayed much higher mean values than the other factors, and that (ii) we found the perceived importance of these two variables to be significantly higher among Internet adopters than among Internet non-adopters. All barrier factors except *financial risks* turned out to have a great influence on the Internet adoption process, with remarkably high differences of means between adopters and non-adopters.

[8] The observed mean values for all subsamples were also compiled into charts (see appendix 1), which clearly demonstrate, graphically, the main findings pointed out in this section.

As logically could be expected, the main motivator for turning Internet adopters into adopters of transaction-based e-commerce is the *shopping efficiency* offered by the medium. All other benefits are, as indicated by the findings, unimportant in this respect. Similarly, the findings related to the barrier factors are coherent: The *shopping limitations* and *financial risks* involved in online purchases clearly inhibit many Internet users from making purchases on the Internet. Statistically significant differences were also observed on the variable *search problems*, but the low mean value nevertheless indicates that this barrier is much less critical.

Factor	Internet adopters	Internet non-adopters	*P*	TEC adopters	TEC non-adopters	*p*
BENEFIT: Shopping efficiency	2.90	2.52	.003*	3.02	2.81	.001*
BENEFIT: Bargain hunting	2.49	2.45	.679	2.51	2.49	.760
BENEFIT: Information efficiency	2.68	2.53	.183	2.73	2.66	.352
BENEFIT: Distribution efficiency	3.06	2.68	.001*	3.03	3.08	.596
BENEFIT: Privacy	2.10	2.22	.363	2.07	2.11	.650
BARRIER: Shopping limitations	2.32	2.71	.000*	2.09	2.49	.000*
BARRIER: Costs	2.09	2.89	.000*	2.07	2.10	.821
BARRIER: Financial risks	3.19	3.17	.896	2.93	3.38	.000*
BARRIER: Search problems	1.67	2.43	.000*	1.53	1.77	.000*

Table 8. Observed importance of factors

Discussion and Conclusions

The results of this study provide support for the assumption that consumer e-commerce adoption/rejection decisions are determined by rational behavior in terms of channel net value - seen as the perceived balance of power between the overall benefits that are likely to accrue by using the Internet, and the overall barriers encountered to using it or to deriving the sought benefits: Internet adopters, and especially the consumers who have embraced online shopping, perceive the total benefits of e-commerce as exceeding the total impediments to embracing/using e-commerce, whereas Internet non-adopters consider the impediments to e-commerce as drastically surpassing the benefits offered by the commercial Internet.

Venkatesh and Brown (2001) argue that improving our understanding of the factors that are influential in adoption, non-adoption, and use of household PCs provides at least a prelude to understanding the factors influencing the household adoption of the Internet and participation in e-commerce. As far as Internet adoption decisions are concerned, our results were quite in line with the authors' findings and postulations: (i) non-adoption decisions (both in terms of Internet and TEC adoption) are based on perceived critical barriers to a much higher extent than on a lack of appreciation of the benefits associated with electronic channels; (ii) limited Internet /computer experience and cost of entry and use turned out to be the most critical impediment to Internet adoption. The same variables were not, however, influential in Internet adopters' decisions to reject transaction-based commerce. Instead, the quality evaluation barrier, the security risks, the lack of trust in virtual sellers, as well as the lack of personal service and enjoyment in shopping turned out to explain why Internet adopters do not embrace online shopping. Our findings thus suggest that the barriers that are critical in consumer e-commerce adoption are, in part, different from the ones (download delays, search problems, security issues) hypothesized by Venkatesh and Brown (2001).

An exploratory factor analysis with subsequent *t*-tests based on the factor scores provided highly interpretable insights with reference to the common underlying dimensions of the benefits and barriers perceived as important and unimportant. As far as Internet adoption is concerned, the shopping and distribution efficiency of the medium seems to be driving adoption, whereas the search problems, shopping limitations, and especially the costs involved were found to be factors affecting the Internet's value proposition negatively, thus hindering adoption. Internet adopters turn into online shoppers primarily due to the *shopping efficiency* offered by the medium in comparison to traditional channels. The main adoption inhibitors as perceived by non-adopters of transaction-based electronic commerce were *shopping limitations* and *financial risks*, a finding which, again, points at rationality in consumer behavior, as both these factors are indeed related to transaction-based e-commerce.

When observing the perceived magnitude of the proposed benefits of e-commerce, it is worth noting that the two motivators that have attracted the greatest attention among scholars and in the popular press, namely *competitive prices* and the *availability of personalized offering* were, in fact, not perceived as important by respondents in any subsample. Instead, the *accessibility and convenience* benefit was seen as the most important benefits in nearly all consumer groups. Notable is the remarkably high mean value (4.48) on this variable among the adopters of transaction-based e-commerce, which indicates that this is the primary motivator for embracing online shopping.

Contribution, Limitations, and Directions for Future Research

As noted by Swaminathan *et al.* (1999), an understanding of reasons for purchasing on the World Wide Web is particularly relevant in the context of predictions made regarding electronic shopping in the future. This study contributes to and extends our understanding of the Internet as a medium for commercial use in the B2C arena, identifying the rationales for adopting or rejecting the Internet and e-commerce by consumers. From a managerial viewpoint, the findings provide support for investment decisions, and for decisions relating to the development of Internet services that address and take the concerns and wants of consumers into consideration.

Although the findings rest upon a rather extensive empirical investigation, the study should in no way be seen as to offer conclusive findings, as it focuses on an area subject to constant changes due to technological advances and changing consumer behavior. As regards the external validity of our findings, it needs to be pointed out that the results are valid only for the Finnish society, which is characterized by a high adoption rate in terms of Internet usage, but a rather low overall volume of transaction-based e-commerce. More empirical studies need to be carried out in cross-cultural settings to widen our knowledge of the reasons for consumer acceptance and rejection of Internet commerce.

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APPENDIX 1

Observed importance of factors by subsamples: Graphical illustrations