

# Internet-based e-shopping and consumer attitudes: an empirical study

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## Abstract

This paper analyses consumer attitudes towards Internet-based e-shopping. It aims to provide a theoretically and empirically grounded initial reference position, against which later research can explore and interpret the effects of changes in variables representing consumer preferences and shifts in these preferences on the success or failure of B2C e-commerce over the Internet. Because of the opportunity to sample at the outset and of *ceteris paribus* conditions following from the tendency for other factors such as e-transactions cost to remain small and constant, Singapore data were employed. Regression analysis shows that the life content of products, transactions security, price, vendor quality, IT education and Internet usage significantly affect the initial willingness of Singaporeans to e-shop on the Internet. Generalising, we suggest that Internet-based B2C e-commerce can profitably be introduced or promoted along similar dimensions in socio-geographically and technologically similar situations. © 2001 Elsevier Science B.V. All rights reserved.

*Keywords:* Consumer attitudes; B2C e-commerce; Internet virtual shopping; Survey; Empirical study

## 1. Introduction

An increasing number and variety of firms and organisations are exploiting and creating business opportunities on the Internet. Concomitantly, extensive research has been published on business to consumer (B2C) e-commerce over the Internet and virtual shopping [3,8,9,13,15,20–22,24]. Data for these studies have predominantly referred to the US, where determining factors ranging from consumer preferences to transaction costs (with respect to logistics, communications, payment, and information) have been identified and their effects

explored. However, the task of discovering the consequences and relative importance of changes in any factor is complicated by the fact that, due to the size and the socio-economic and technological diversity of the US, it is difficult to discover data in which the appropriate *ceteris paribus* conditions are present.

So far, the Internet has had a limited impact on Singaporeans' way of life. A healthy growth in consumption and the technological culture notwithstanding, virtual retailing has yet to establish itself in a prominent position in the country's markets. However, with the tightening of time constraints and more widespread applications of IT, a demand for B2C e-commerce over the Internet is emerging. Given Singapore's small size and its already advanced and well-organised infrastructure and banking, the

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logistics, communications, and payment costs associated with this way of shopping would tend to be low and unlikely to change by any significant extent (especially upward) in the medium run. In sum, therefore, an opportunity arises to evaluate the attitudes of (largely) culturally homogeneous consumers towards Internet-based B2C e-commerce at the outset, under conditions where the effects of other factors that clouded the data in previous studies remained small and constant. We obtained a theoretically and empirically grounded initial reference position, against which later research would be able to examine and interpret the effects of changes in variables representing consumer preferences and shifts in these preferences on the success or failure of Internet-based B2C e-commerce. Moreover, through appropriate interpretation of parametric change in the empirical analysis, it would be possible to explore the consequences of possible (future) changes in Internet transaction costs indirectly, especially with respect to payment, logistics, communications, and asymmetric information.

Regression analysis shows that initial willingness to e-shop on the Internet depended on the Singaporean consumer's attitudes towards the life content of products, transactions security, retail price, service quality of vendors, IT education, and Internet usage. In addition to providing a reference point, this result generalises to suggest that Internet-based B2C e-commerce can profitably be introduced or promoted along similar dimensions in socio-geographically and technologically similar situations. Efforts to render virtual retailing over the Internet more attractive in terms of shopping experience would be particularly important, together with higher quality e-vendor service.

## **2. Consumer attitudes and Internet-based e-shopping**

Extending current research, we present the following consumer perceptions of product characteristics, product differentiation, and the market environment as major determinants of the initial willingness of Singaporeans to e-shop over the Internet. Given the country's cultural homogeneity, aggregation conditions for consumption preferences

can be assumed to be satisfied within the scope of the study.

### *2.1. Transactions security*

Transactions security on the Internet has received considerable attention in theory and practice, both directly in the form of safe and accurate transfers of money or payment-credit information, and indirectly in the form of transaction risks-transaction costs. "Fraud-free electronic shopping" was promoted as early as 1995 in UK [27], followed 2 years later by the introduction of secured electronic transaction (SET) systems into Europe and Singapore [16,17]. The latter initiative formed part of an Electronic Commerce Hotbed programme, and it has been suggested that once concerns regarding transactions security are overcome, Internet-based virtual retailing would take-off in Singapore [25,26,29].

### *2.2. Price*

The (direct) price of e-shopping over the Internet falls into two parts. An individual must first pay the market participation price or purchase the necessary computer hardware, software, Internet subscription, and provide for future updating and replacement. By strict accounting principles, a part of this fixed cost should be included in the price of any e-purchase. Though set-up outlay is relatively modest in a technologically advanced and technologically open country like Singapore, Internet-based e-shopping would still tend to display the characteristics of a superior good, especially at the outset. As the prices of computer products and Internet accounts fall with technical progress and competition and consumers become more attracted by the e-marketplace [19,23], a reduction in set-up outlay would produce a positive effect on Internet-based virtual retailing in Singapore.

To avoid introducing extraneous considerations of how individual accounting would allocate a fixed cost to different computer applications, in our survey and interviews we confined queries relating to "price" to the second part of the price of e-shopping over the Internet — viz. the retail price of the good in question, as offered in virtual and traditional stores. The effects of set-up outlay are then parametrised in terms of consumption superiority.

### 2.3. Shopping experience

Shoppers are very often of the ‘touch-and-feel’ type, who prefer to handle and compare goods before deciding to buy. Given the small geographical size of Singapore and the physically concentrated nature of its consumption good markets, it would not be costly for individuals to interact face-to-face over the shop counter, touching and feeling products, and rummaging through the merchandise. Singaporeans regard shopping as an organic experience, and enjoy roaming the malls in search of bargains while having an outing with the family. Under these circumstances, it was important to discover whether consumers perceived at the outset that virtual shopping over the Internet would engender a comparable experience, and how significantly life content considerations tended to affect decisions to shop in this way.

### 2.4. Vendor quality

Poor vendor quality, especially as regards ‘lemons’ [2], has been identified as a significant disincentive to virtual retailing over the Internet. Before shifting from traditional shopping, therefore, ‘touch-and-feel’ oriented Singaporean consumers would demand at least comparable quality from virtual retailers [4,6,18,31]. Given the lemon problem, efforts to improve e-vendor quality would tend to relate to basic considerations, such as variety in the choice of products, ease of placing, altering and cancelling orders, and the efficient handling of returns and refunds [7,10]. Growth of the e-marketplace would depend importantly on further improvements in e-vendor quality, especially with regard to the information asymmetry inherent in non-standardised products. Since standardised consumption goods such as tickets (reservations) were beginning to be successfully e-marketed in Singapore [28,30], it was important in the first place to evaluate the effectiveness of this willingness on the part of Internet vendors to cultivate consumer preferences by offering items for which the shopping experience is similar to traditional store counters.

### 2.5. IT education and Internet usage

In Singapore, computer literacy is emphasized at all levels of education. The question therefore, becomes:

did more IS-IT knowledge make consumers more likely to e-shop over the Internet upon its introduction? The individual’s level of Internet usage can conveniently be measured by the frequency of access and the duration of each access.

### 2.6. Network speed

It has been suggested that e-shopping over the Internet is technically too complex for the average consumer, even after the introduction of 56 K modems [12]. We therefore, investigated whether ease of use in the form of higher network speed constitutes a significant determinant of the Singaporean consumer’s attitudes towards Internet-based e-shopping at the outset.

## 3. Research methodology

A survey and interviews were employed to gather information regarding Singaporean consumer attitudes towards Internet-based B2C e-commerce, upon its active introduction in 1997–1998. Because of the specific time-focus of this initial reference position, the fact that data referring to the Internet and Internet usage are quick to age does not present a significant problem in this study.

Following the standard approach [1,5,11,14], we measure consumer perceptions and related variables in terms of a Likert-type scale ranging from 1 to 5 with the following equivalences, ‘1’: ‘not important’ or ‘strongly disagree’; ‘2’: ‘slightly important’ or ‘slightly agree’; ‘3’: ‘neutral’; ‘4’: ‘important’ or ‘agree’; and ‘5’: ‘very important’ or ‘strongly agree’. Individuals without knowledge or experience of the Internet may harbour a latent willingness to e-shop on it, but it would be difficult to elicit such information through a survey. Given the exploratory nature of the study and consistently with our interpretation of ‘price’, we decided to leave out considerations of a latent nature. The sample was therefore, restricted to Internet users in Singapore. A questionnaire on consumer attitudes designed and pre-tested according to the standard approach was dispatched to 1000 such individuals, securing 312 meaningful responses (31%). Its contents were framed with regard to the fact that Internet logistics,

communications, and payment costs tended to remain small and constant over the relevant duration. Assistance was supplied in case of difficulty, and Microsoft Excel and SPSS were employed in data analysis. To complement the survey, we conducted interviews with Brel Software Private Ltd., MOG, and TV-Media. All these companies have been actively involved in developing and promoting B2C e-commerce in Singapore.

#### 4. A regression model of willingness to e-shop over the Internet

We employed a regression model to quantify the effects of the identified factors on the initial willingness of Singaporeans to e-shop on the Internet:

$$y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 + \beta_6x_6 + \beta_7x_7 + u \quad (1)$$

The dependent variable measures consumer willingness, while the right hand side of the equation contains explanatory variables other than (relative) price and income. Analytically, therefore, the above expression represents more than a demand function. The independent variables are,  $x_1$ : perceived risks associated with transactions security in Internet-based e-shopping;  $x_2$ : level of education and training in computer applications and IT;  $x_3$ : representative retail price on the Internet e-market;  $x_4$ : consumer perceptions of the relative life content of Internet-based e-shopping;  $x_5$ : perceived quality of Internet e-vendors;  $x_6$ : level of Internet usage;  $x_7$ : network speed.

#### 5. Empirical results and interpretation

Ordinary least squares (OLS) regression results are shown in Table 1. They yield the following equation for the initial willingness of Singaporeans to e-shop on the Internet:

$$y = 2.48 - 0.22x_1 + 0.38x_2 - 0.10x_3 - 0.42x_4 + 0.45x_5 + 0.25x_6 + 0.02x_7 \quad (2)$$

Since the first six independent variables yield significant  $P$ -values for their coefficients, the corresponding factors were found to be major determinants of the willingness of the Singaporean consumer to e-shop on

Table 1  
OLS regression results

	Unstandardised coefficients ( $b_k$ )	Standardised coefficients ( $b_k^*$ )	$t$	$P$ -value
Constant	2.48		4.54	<0.01
$x_1$	-0.22	-0.16	-5.50	<0.01
$x_2$	0.38	0.17	7.20	<0.01
$x_3$	-0.10	-0.05	-2.95	<0.01
$x_4$	-0.42	-0.31	-9.57	<0.01
$x_5$	0.45	0.22	5.60	<0.01
$x_6$	0.25	0.22	5.99	<0.01
$x_7$	0.02	0.02	0.81	0.42

the Internet. In addition, we computed a  $F$ -value of 545.3 (d.f. = (7, 304),  $P < 0.01$ ) and an adjusted  $R^2$  of 0.9. The regression results therefore, suggest that Eq. (1) satisfactorily explains the initial willingness of Singaporeans to e-shop on the Internet. The effect of a change in any variable representing consumer perceptions would be given by its regression coefficient, while a shift in any specific aspect of consumer attitudes can be interpreted in terms of a parametric change in the corresponding coefficient.

We offer the following conclusions and interpretations with regard to Singaporean consumer attitudes towards Internet-based virtual retailing at the outset, and their willingness to shop in this fashion.

(i) Transactions security is a significant factor, with perceived transaction risks exerting a negative effect on willingness ( $b_1 = -0.22$ ,  $P < 0.01$ ). If these risks increase, consumers would become more reluctant to post-credit information over the Internet. Possible (future) changes in the payment component of Internet transactions cost can be introduced indirectly into the analysis through parametric change in the transaction risks coefficient, interpreted in terms of shifts in consumer attitudes in this dimension. Such an instance would be the introduction of individually encrypted e-purses by banks specialising in e-commerce at some future time, leading to a reduction in Internet payments cost, a parametric decrease in the importance consumers attach to perceived transaction risks, a less negative regression coefficient, and an increased willingness to e-shop over the Internet (other things being equal). This suggests a two-stage procedure by means of which, once a theoretically and empirically grounded reference position is found, we can explore the effects of possible (future) changes in Internet

transaction costs by appropriately interpreting parametric change in specific regression coefficients.

Interviews with Brel Software, MOG, and TV-Media elicited the belief that, if payment was more secure, Singaporean consumers would be more receptive towards Internet-based e-shopping. It was expected that, after the successful implementation of Singapore's first VISA SET on the Internet by the National Computer Board, Citibank VISA International, IBM, Brel Software and Mentor, B2C e-commerce over this avenue would increase [33].

(ii) Though the regression equation is analytically more than a demand function, we obtained a price elasticity consistent with demand theory. If price rises, willingness to e-shop declines ( $b_3 = -0.10$ ,  $P < 0.01$ ). Two observations should be noted regarding the magnitude of this coefficient, and the apparent absence of relative price in the regression equation. Since set-up outlay does not enter explicitly, the coefficient  $b_3$  only reflects the influence of retail price over the Internet. In a physically concentrated market environment with an efficient infrastructure and low transport cost and strong competition, the same good cannot sell for significantly different amounts in ordinary and e-shops. In the regression equation, therefore, the effects of any price change would tend to overlap considerably between the two markets, and moreover would (other things being equal) reflect relative shifts. Secondly, having incurred a fixed outlay that is substantial relative to expenditure on any single item, Internet users would be less attracted by the substitution effect of physical shopping (for the same good). In sum, we can therefore see why a change in price produces only a slight effect.

Given this regression result, we can interpret possible (future) changes in the logistics-delivery component of Internet transactions cost indirectly. A reduction in logistics-delivery cost on the supply side would lead to a lower (relative) price independently of the demand side and therefore to an increase in the willingness to e-shop on the Internet (other things being equal). If consumers now perceive this way of shopping to be more convenient, parametrically demand would become less elastic. The parametric change in consumer perceptions results in a less negative price coefficient, leading to an increased willingness to e-shop over the Internet (other things being equal).

(iii) Since set-up outlay does not enter explicitly into the regression equation, its effects are parametrised in terms of the consumption superiority of Internet-based e-shopping. The positive sign for the constant coefficient ( $b_0 = 2.48$ ,  $P < 0.01$ ) is consistent with this hypothesis. The result follows that as the number of individuals able to support set-up outlays (relative to wealth and income) increases in Singapore, willingness to e-shop over the Internet would increase. If we interpret possible (future) changes in the communications component of Internet transactions cost indirectly in terms of parametric changes in relative set-up outlay, a fall in communications cost would lead to a more positive constant coefficient and an increased willingness to e-shop on the Internet, other things remaining the same. (To the extent that set-up outlay is low, the scope for further reductions in its magnitude would be small). At sufficiently low communications cost, one-to-one e-marketing [32] would become viable on the Internet, other things being equal.

Receptive audiences to Internet-based B2C e-commerce — mainly younger individuals with good IT education possess relatively limited spending power at the moment, while older people with the wherewithal are usually less enthusiastic about virtual shopping. Extrapolating the demographics, retailing over the Internet may be expected to pick up in Singapore, as the younger generation acquires more wealth and the ability to satisfy a stronger propensity to e-shop.

(iv) Concern about the life content of the products virtually marketed over the Internet was found to have a negative impact on willingness ( $b_4 = -0.42$ ,  $P < 0.01$ ). Since Internet-based e-shopping tends to be comparatively weak in the leisure and 'touch-and-feel' aspects, new or purposely-designed products would be necessary for it to compete. Consumption goods which rely heavily on senses other than sight are not likely to sell easily in the e-marketplace. This observation is in line with an interview conducted with Brel Software: it was noted that items such as fashion clothing and shoes are not likely to be candidates for virtual retailing over the Internet.

(v) Willingness to e-shop on the Internet was found to be positively related to consumer perceptions of e-vendor quality ( $b_5 = 0.45$ ,  $P < 0.01$ ). This suggests that increased convenience and promptness of purchase, more dedicated after-sales service, and

(perceived) value-for-money represent important quality dimensions along which Internet-based B2C e-commerce can effectively compete. In the case of relatively standardised consumption goods, quality is known with little variation from product description. Singaporeans attracted by higher quality e-vendor services would therefore feel safe about purchasing without worrying about “lemons”.

As regards the introduction of less standardised consumption goods at a later stage, we suggest that the problem of e-vendor quality under asymmetric information can be mitigated by an independent agent responsible for quality evaluation. If we interpret a possible reduction in (asymmetric) information cost indirectly in terms of a parametric increase in the importance consumers attach to perceived e-vendor quality, a more positive regression coefficient and an increased willingness to e-shop on the Internet would follow, other things being equal. Virtual retailers and public bodies like a standards authority or consumer council can jointly establish and fund an agency, a ‘Better e-Business Bureau’ perhaps, to test, ensure, and (if possible) improve product and vendor quality before marketing on the Internet. Alternatively, the agency can perform evaluations on demand, against a fee and the promise of payment in full if the required quality standards are found to be met. (If necessary, additional money can be made available out of increased e-retail receipts from the mitigation of the lemon problem).

(vi) The regression result  $b_2 = 0.38$  ( $P < 0.01$ ) suggests that the more Singaporeans are educated in computers and IT the more they would be willing to e-shop over the Internet, even at the time it was being introduced. Computer-literate individuals would not be deterred by technical demands, so they would tend to be more attracted by the opportunities presented by the Internet e-marketplace.

(vii) The regression result  $b_6 = 0.25$  ( $P < 0.01$ ) show that Singaporeans who access the Internet more often are more willing to e-shop on it, even when virtual retailing was something new.

(viii) The regression result  $b_7 = 0.02$  ( $P = 0.42$ ) indicates that higher network speed is not a significant determinant of the initial willingness of Singaporeans to e-shop on the Internet. Though Internet users accustomed to computer-level speeds are likely to find it more attractive to wait for product images to

appear on the screen than to spend time visiting traditional stores, the regression result can be explained by the fact that, with the installation of fibreoptic cables in the Singapore ONE and ISDN networks just prior to the study, the broader bandwidth had already provided a satisfactory transmission speed to the individuals surveyed. This finding supports the observation (Section 1) that many elements of Internet transaction costs, such as e-search cost, are already very low in infrastructurally and technologically advanced countries like Singapore.

## 6. Concluding remarks

This paper analyses the initial effects and relationships between consumer attitudes and Internet-based e-shopping. We were able to sample Internet B2C e-commerce at the time of its active introduction into Singapore, where in addition *ceteris paribus* conditions followed from the tendency for logistics, communications, and payment costs over the Internet to remain small and constant. Our aim was to obtain a theoretically and empirically grounded initial reference position, against which later research can examine and interpret the role played by changes in the variables representing consumer preferences and shifts in these preferences: in particular, our findings can usefully be compared with results showing the subsequent success or failure of Internet-based B2C e-commerce. Moreover, through appropriate interpretation of parametric change in the regression analysis, we can explore the consequences of possible (future) changes in Internet transaction costs, especially with respect to payment, logistics-delivery, communications, and asymmetric information.

Regression analysis shows that the life content of products, transactions security, price, vendor quality, IT education and Internet usage significantly affect the initial willingness of Singaporeans to e-shop over the Internet. Generalising from this finding, virtual retailers in socio-geographically and technologically similar situations and locations may wish to consider the path of least resistance, and first cultivate the preferences of consumers accustomed to the traditional environment by offering goods which do not require much ‘touching-and-feeling’ before purchase. Initiatives to increase the life content of products and render

the virtual marketplace more attractive and enjoyable in terms of shopping experience would be required for further development. A similar remark applies to the quality of e-vendors, especially with regard to the lemon problem and the need for an independent agency to perform quality evaluation of goods and services marketed over the Internet.

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