Understand Users: Factors that Affect Users' Perception of a Website's Quality

Yun-Ke Chang, Hwee-Ming Lam, Chooi-Chin Liew, and
Miguel A. Morales-Arroyo
Wee Kim Wee School of Communication and Information,
Nanyang Technological University, Singapore
Email: ykchang@ntu.edu.sg; lhmljc@yahoo.com; liew0030@ntu.edu.sg; miguel@yun-ke.com

Abstract

With the growing amount of information available on the Internet and affordable IT product and services, people tend to go online when they have information needs. Information literacy initiatives often times focus on educating public in how to evaluate and verify information in various formats such as text, image, audio and video. One important issue in conducting any instructional methodology is to understand the status of the minds of the learners. The authors of this paper suggest understanding how Internet users perceive the quality of web sites is the first step in designing the content of an information literacy program so that lessons can be created to reinforce right attitude while correct inaccurate public opinions about online information. The objective of this study is not to judge users' level of information literacy but to suggest areas that should be taken into consideration or reevaluated in information literacy initiatives. This paper reports the results of a study conducted in Singapore in an attempt to understand factors that affect users' perception of the quality of e-commerce websites. Survey questionnaires with 90 factors were used to collect users' perception of quality factors in eight categories. More than 100 participants of age 21 to 50 answered the survey during February and March 2007. The result of data analysis suggested that users placed high expectation in the accuracy of web site content, security, and usability. The attractiveness of a site is considered less important. However, it was observed security policy or protocols are not well communicated with users in several existing e-commerce websites in Singapore

Keywords: E-commerce websites; Quality factor; Cluster analysis; Perception; Survey

1. Introduction

Singapore is one of the countries with high Internet penetration rate. In 2004, Singapore was ahead of the United States as "the most-IT savvy country."(E-commerce Country Commerce, 2006) An annual survey on Infocomm usage in Singapore showed that 66% of the household and 61% of the Internet population aged 15 years and above had access to Internet; 27% of the Internet user population made online purchase (2005). With this high Internet usage, it will be useful to study what Singapore users perceive as important in the quality factors of e-commerce web sites

There are two general categories of e-commerce: Business-To-Consumer (B2C) and Business-To-Business (B2B). B2B e-commerce involves online trading between business entities and trades in high volumes (Business-to-business electronic commerce, 2007). Between B2B and B2C e-commerce in Singapore, B2B was ahead of B2C e-commerce. In 2000, B2B transaction value was 5.3 times higher than that of B2C transaction value (Wong, 2003). Singapore users doing online purchase grew about 10% from year 2002 to 2003 and remained the same from 2004 to 2005 (Annual Survey on Infocomm Usage in Households and by Individuals for 2005). Wong (2003) explained that the limited potential for B2C e-commerce market was due to the small domestic market, for Singapore has a population of 4 million, and also due to the lacking behind of Internet usage in neighboring countries.

Among Singaporean users, the five most popular products purchased online were travel products (28%), clothing, footwear, and sporting goods (26%), tickets (19%), computer equipments (12%), and entertainment products (12%). The objectives of the research are to identify the key quality factors of B2C e-commerce web sites as perceived by online customers in Singapore, considering the customers need not inspect good before the purchasing.

2. Literature Review

Many researches on the quality of e-commerce web sites have been conducted. While there was no consensus on the most effective design criteria for these web sites, robust user interface could provide better representation of information and consumer goods, making online storefronts more user friendly leading to increased sales (Stibel, 2005). It is also generally understood that the purpose of better designed e-commerce web sites was not the use of state-of-the-art technology, but the support of consumers' shopping and transaction experience (Chau et al, 2002).

Kim, Shaw, and Schneider (Kim et al, 2003) investigated 245 web sites from 12 industries (banks, cosmetics, department store, food, insurance, information systems, newspaper, publishing, security, online mall, telecommunications, and television) in Korea. The evaluation criteria selected were business function, corporation credibility, content reliability, web site attractiveness, systematic structure, and navigation. Another survey of webmasters of Fortune 1000 companies in the united states on their perception of quality factors of web site design showed that web site quality depended on information quality, learning capability, playfulness, system quality, system use, and service quality (Liu et al, 2000).

Merwe and Bekker (2003) devised comprehensive evaluation criteria for e-commerce web sites based on a customer buying model. Each stage of the customer buying process was mapped to the most appropriate web site feature. In their proposed framework, the four stages of customer buying process and the relevant web site design category were (a) needs recognition, where customer would visit the web site, so user interface was critical; (b) gather information, where customer would look around the web site for information, so navigation was critical; (c) evaluate information, where customer would make choices based on the information they gather, so content was critical; (d) make purchase, where customer would purchase from the web site, so reliability was critical. Similarly, Kuo, Hwang and Wang (2004) also proposed a framework based on a ten-step consumer behaviour model and the essential web site features in each step, and there were also Teo and Yeong (2003), using a consumer decision process model to understand the relationships among various stages.

These studies discussed above shared similar stages in their consumer decision models. Basic activity in each stage was (a) need to purchase a product, (b) gather necessary information, (c) evaluate information gathered, (d) purchase the product, and (e) use and evaluate the product. Certain web site design features were more important in a certain stage than in other stages. The authors of this paper adopted the main category headers developed by Rababah et al (2006) while giving our definitions. They are (a) Attractiveness – Concerned with the extent to which the web site is visually appealing, consistent, fun and easy to use and how these elements positively affects the customers purchasing decision; b) Content Adequacy – Concerned with such issues like relevancy, accuracy, scope, level of detail, quality, and timeliness of the information; (c) Readability – Concerned with clarity of information and how easy it is for users to grasp the information provided; (d) Reliability – Concerned with the extent of personalization of information, customer services, and promotions of product or services; (e) Efficiency –

Concerned with the speed of access and the availability of the web site at all times; (f) Navigation – Concerned with the issues of how easy it is for users to obtain required information using navigational aids, searching, help, FAQ (Frequently Asked Questions), and other means; (g) User Friendliness – Concerned with the ease of guiding the users in the buying process from searching for information, comparing and evaluating, and finally paying for the purchase. (h) Security – Concerned with the security system provided for online payment and protection of users' privacy of using the web site. Table 1 lists selected three items in each category.

Table 1: List of Selected Three Items in Each Category in the Survey used in the Study

	Quality Factors
A	Attractiveness (listing 3 of 6 items only)
A1	First impression of the web site is professional.
A2	Web site is entertaining.
A3	Web site promotes customer excitement.
C	Content Adequacy(listing 3 of 13 items only)
C1	General corporation information such as company's address, contact, etc is stated.
C2	Announcements such as What's news, new products, promotion, etc are displayed.
C3	Customers' reports such as user review, testimony, etc are displayed.
R	Readability(listing 3 of 6 items only)
R1	Purpose of the web site is stated clearly.
R2	Content can be understood.
R3	Terminology is used consistently.
T	Reliability(listing 3 of 7 items only)
T1	Customer profile is stored in the web site.
T2	Personalised services through customised contents, personal greetings, etc are available.
T3	Acknowledgement receipt is sent electronically for queries, complaints or feedback made.
E	Efficiency(listing 3 of 6 items only)
E1	Web pages generation speed is reasonable.
E2	Graphics generation speed is reasonable.
E3	Multimedia loading speed is reasonable.
N	Navigation(listing 3 of 19 items only)
N1	Content is logically structured in appropriate sections and levels.
N2	Menus are understandable.
N3	Navigation aids such as site map, table of content, product index are easy to use.
U	User Friendliness/Ease of Use(listing 3 of 27 items only)
U1	Web site layout is easy to understand.
U2	Icons are easy to understand.
U3	Graphics helps in the navigation of the web site.
S	Security(listing 3 of 6 items only)
S1	Secure payment system used such as pay pal or Secure Socket Layer, etc.
S2	Security protocols is well explained
S3	Security policy is accessible.

3. Methodology

A survey was conducted to develop empirical evidence on the important web site quality factors. The questionnaire consisted of ninety quality factor statements under eight categories: Attractiveness (attractiveness of the web site design), Content Adequacy (content relevant to the purpose of the web site), Readability (content is readable), Reliability (customer service is reliable), Efficiency (web site is responsive), Navigation (ease to navigate around the web site), User Friendliness (web site is easy to use), and Security (online transaction is secured). There are between six to twenty-seven items in each category. A five-point Likert scales was used to measure the degree of importance from the 'Most Important' (5) to 'Not Important' (1).

The survey comprised of demographic profile: age, gender, education level, occupation, income category and other information such as credit card owed, e-shopping experience, and reasons for shopping online. The survey also sought to capture the respondent's

opinions on what made up a good e-commerce web sites and whether they would be willing to shop at Singapore e-commerce web sites. Majority of the respondents were part-time working adults from the University. 57.3% responded were female; 69.3% aged between 26 and 35 years old; 93.5% had education qualification of degree and above; and 71% were working, in which 67.8% earned between $1000 and $4999. 77.4% owned a credit card and 71.8% have shopped online before.

A series of web site evaluations using the proposed quality factors were conducted and factor analysis was preformed on the data to further understand the quality factors; however, we will only give a brief summary in the discussion section without reporting the details in this paper due to limited space.

4. Data Analysis

To obtain the key quality factors (value of 4 and above), the means of scores (denoted by P-mean) of quality factors from the respondents were computed. 28 out of 90 quality factors (mean score $>= 4$) were perceived to be key quality factors. These factors were linked directly to the purchasing process that involved the accuracy of the content (9 statements out of 13 statements from Content Adequacy), security of the purchase (6 out of 6 statements), and usability that facilitated the purchase process. Table 2 lists these key factors and their scores.

Table 2: List of Key Quality Factors

Code	Quality Factor	P-mean
C1	General corporation information such as company's address, contact, etc is stated.	4.040
C6	Product information is accurate.	4.500
C7	Product pricing is stated including discount.	4.468
C8	Other pricing such as tax and other charges are stated.	4.387
C9	Content is up-to-date (last update is displayed).	4.395
C10	Terms and conditions of sales are stated.	4.315
C11	Shipping and return policy is stated.	4.347
C12	Instructions on how to order and purchase is stated.	4.355
C13	A complete overview of the order is presented before final purchase decision.	4.444
E6	Time taken to complete the order and purchase process is short.	4.040
N2	Menus are understandable.	4.040
R2	Content can be understood.	4.016
S1	Secure payment system used such as pay pal or Secure Socket Layer, etc.	4.484
S2	Security protocols is well explained	4.161
S3	Security policy is accessible.	4.137
S4	A formal privacy and confidentiality policy is accessible.	4.153
S5	Privacy of customer is protected.	4.605
S6	External validation of trustworthiness such as trustsg logo, Verisign Secured Seal, eNets, etc. is accessible for verification.	4.403
T3	Acknowledgement receipt is sent electronically for queries, complaints or feedback made.	4.129
T6	After-sales support information or service is available.	4.081
U11	It is easy to follow the ordering process: add to cart, remove from cart, and checkout.	4.122
U12	Summary of the order is visible during eshopping and before checkout.	4.129
U14	Products can be browsed without any customer registration.	4.105
U20	Payment options are offered.	4.169
U22	Acknowledgement of order is sent to customer immediately.	4.250
U23	Purchase confirmation for the cancellation and return of products is available.	4.347
U24	Alert message appears when customer makes an error.	4.105
U25	Error message is understandable by customer.	4.073

(a) Correlation among variables

To explore the relationship (strength and direction) among the quality factors categories, It was found that there were strong and positive correlations between the quality factor categories [r>0.3, n=124, p<0.01] except for the Attractiveness category (refer to Table 3 for detailed results). Respondents did view Attractiveness category as a separate entity which only correlated strongly with Readability Category and was not related to Security. This could be interpreted as an attractive web site did not mean a secure web site or gain users' trust.

Table 3: Correlations among Factors

Correlations

		Cat_A	Cat_C	Cat_R	Cat_T	Cat_E	Cat_N	Cat_U	Cat_S
Cat_A	Pearson Correlation	1	.280**	.157	.197*	.185*	.205*	.197*	.106
	Sig. (2-tailed)		.002	.082	.029	.040	.022	.028	.239
	N	124	124	124	124	124	124	124	124
Cat_C	Pearson Correlation	.280**	1	.583**	.378**	.534**	.492**	.583**	.586**
	Sig. (2-tailed)	.002		.000	.000	.000	.000	.000	.000
	N	124	124	124	124	124	124	124	124
Cat_R	Pearson Correlation	.157	.583**	1	.430**	.534**	.630**	.638**	.336**
	Sig. (2-tailed)	.082	.000		.000	.000	.000	.000	.000
	N	124	124	124	124	124	124	124	124
Cat_T	Pearson Correlation	.197*	.378**	.430**	1	.454**	.519**	.567**	.313**
	Sig. (2-tailed)	.029	.000	.000		.000	.000	.000	.000
	N	124	124	124	124	124	124	124	124
Cat_E	Pearson Correlation	.185*	.534**	.534**	.454**	1	.694**	.667**	.502**
	Sig. (2-tailed)	.040	.000	.000	.000		.000	.000	.000
	N	124	124	124	124	124	124	124	124
Cat_N	Pearson Correlation	.205*	.492**	.630**	.519**	.694**	1	.830**	.474**
	Sig. (2-tailed)	.022	.000	.000	.000	.000		.000	.000
	N	124	124	124	124	124	124	124	124
Cat_U	Pearson Correlation	.197*	.583**	.638**	.567**	.667**	.830**	1	.549**
	Sig. (2-tailed)	.028	.000	.000	.000	.000	.000		.000
	N	124	124	124	124	124	124	124	124
Cat_S	Pearson Correlation	.106	.586**	.336**	.313**	.502**	.474**	.549**	1
	Sig. (2-tailed)	.239	.000	.000	.000	.000	.000	.000	
	N	124	124	124	124	124	124	124	124

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

(b) Cluster Analysis

Cluster Analysis was selected to discover the structures in data (cluster) of the quality factors perceived by the respondents. The output Figure 1 showed that clusters were grouped nicely according to their category such as security, efficiency, readability, content adequacy and attractiveness. This also suggested certain level of validity of our survey instrument. The other three categories: navigation, user friendliness and reliability were divided into smaller and separate clusters. A detailed examination of the data revealed that there were some forms of sub-categories among the two categories of N and U. For example, the quality factors: U11, U12 and U14 as a cluster were related to shopping feature and quality factors: U13, N18 and N19 were related to help feature.

(c) Open-Ended Questions

In the questionnaire, there was a free text for respondents to express their opinions on what make up a good e-commerce web site. Security ranked the top, followed by User Friendliness, Navigation and Content Adequacy. Other factors cited by them were good discounts, trust, and convenience.

There were 18 (14.5%) respondents who would not shop online even though the web sites were meeting their expectations. The reasons were personal shopping preference such as wanting to feel the physical product, not used to online shopping, and fear in shopping online due to phishing and theft cases. Examples of their comments include "Still not that comfortable with online purchases, like to be able to see and touch the goods before

buying," and "The security of the financial transaction and my financial details are of the utmost concern to me besides the worthiness of the transaction."
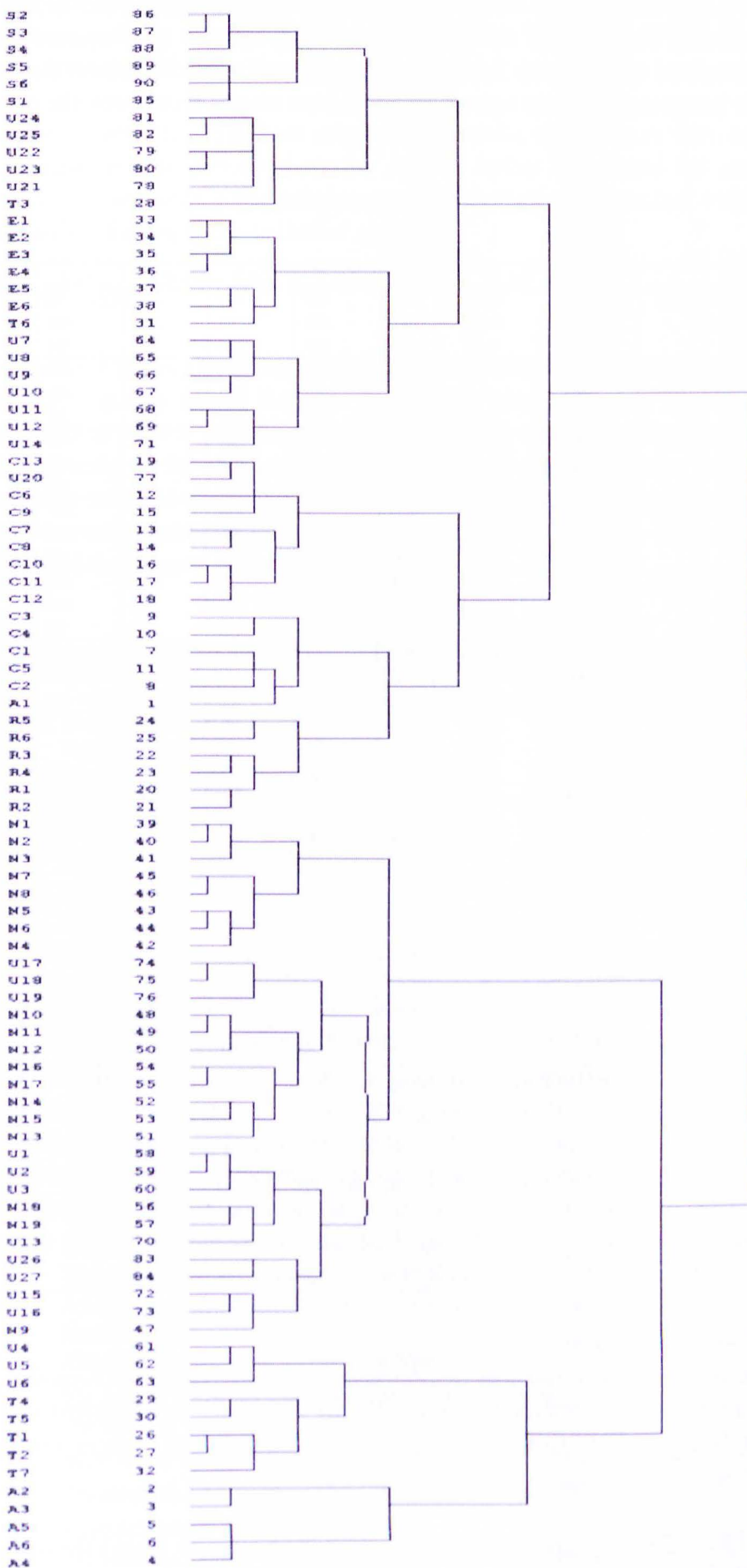

Figure 1: Cluster Analysis

5. Discussion

The advancement of the web technology has created complexity in web designing such as the appearance of the web interface and the functionalities of the web site. To create an e-commerce web site that would generate substantive profit to the companies would be an uphill task. Understanding customers would be the utmost important consideration in designing user-centered web sites. In the business world, customers are king. The findings of this research would lead to some understanding of the customers' preferences on commercial web site and how online companies could improve their web sites to better serve their customers and increase their profit from online business.

In this research, the respondents expected a good e-commerce web site to have high Content Adequacy such as accurate product descriptions and company profile, high Security in terms of protecting the online transaction and customers' privacy, and high usability related to the purchasing process such as easy to follow the ordering and payment process, short time spent in purchasing, and so on.

The respondents did not view an attractiveness web site as equivalent to a secure web site. A secured web site required the use of Secured Socket Layer (SSL) and other external validation such as Verisign, which would validate the credit card number without the use of security pin. This observation was further reinforced by cluster analysis. In cluster analysis, the second cluster at level 15 consisted of quality factors, which were rated below 3.5 and attractiveness formed the last cluster, away from the most important quality factor, Security.

Also, the users who shopped online were of higher education level and have wider exposure to Internet. Therefore, the requirements from the users would be more complex besides professional look of the web sites. Companies would have to place greater emphasis on their shopping functionalities (usability), reliability and security of the web sites to increase the confidence in shopping online and protect online transaction.

For web site quality factors, the cluster analysis displayed the clusters of related quality factors were grouped appropriately into the relevant category such as Security, Efficiency, Content Adequacy and Readability. Navigation and User Friendliness were divided into smaller clusters. For example, the two clusters such as U21 to U25 and C6 to C13 were related to shopping features clustered together. The latter was separated from the cluster consisting of C1 to C5, which was related to general information. As a design guideline, web designer should consider grouping related quality factors together and develop these factors as a whole, which would project a sense of completeness. For future studies, one thing to consider is that different industry might have different requirements on the quality factors, thus the different sets of evaluation criteria could be designed to evaluate industry from different web sites (Marsico and Levialdi, 2004; Huang et al, 2006).

In a factor analysis using data collected from web site evaluations, (not included in this paper,) none of the quality factors from the Attractiveness category was contributed to the total variance. All quality factors in Attractiveness and Readability categories have exceeded the expectation of the respondents.

There are many factors affecting user's perception of the quality of web sites. We are encouraged to see that trust and reliability are among the top factors when users consider the quality of web pages, not merely the attractiveness. The next step in information literacy curriculum design would be introducing criteria for judging web site security to users.

References

Annual Survey on Infocomm Usage in Households and by Individuals for 2005. (Online), Retrieved 8 Jan 2007. Available at: http://www.ida.gov.sg/Publications/ 20061207182001.aspx

Business-to-business electronic commerce. (Online), Retrieved 26 Jan 2007. Available at: http://en.wikipedia.org/wiki/Business-to-business_electronic_commerce

Chau, P.Y.K., M. Cole, A.P. Massey, MitziMontoya-Weiss and R.M. O'Keefe. 2002. Cultural Differences in the Online Behavior of Consumers. *Communications of the ACM* 45 (10): 138-143.

E-commerce *Country Commerce. Singapore,* EIU: Economist Intelligence Unit, 2006, 82-89.

Huang, W., T. Le, X. Li, and S. Gandha. 2006. Categorizing web features and functions to evaluate commercial web sites: An assessment framework and an empirical investigation of Australian companies. *Industrial Management & Data Systems* 106 (4): 523-539.

Kim, S.-E., T. Shaw, and H. Schneider. 2003. Web site design benchmarking within industry groups. *Internet Research: Electronic Networking Applications and Policy* 13 (1): 17-26.

Kuo, H.M., S.L. Hwang, E.M.Y. Wang. 2004. Evaluation research of information and supporting interface in electronic commerce web sites. *Industrial Management & Data Systems* 104 (9): 712-721.

Liu, C., K.P. Arnett, and C. Litecky. 2000. Design quality of websites for electronic commerce: Fortune 1000 webmasters' evaluations. *Electronic Markets* 10 (2): 120-129.

Marsico, M.D. and S. Levialdi. 2004. Evaluating web sites: exploiting user's expectations. *Int. J. Human-Computer Studies* 60: 381-416.

Merwe, R.V.D., and J. Bekker. 2003. A framework and methodology for evaluating e-commerce web sites. *Internet Research: Electronic Networking Applications and Policy* 13 (5): 330-341.

Rababah, O., R. Dawson, R. Knott, and F. Masoud. 2006. E-commerce websites quality factors and their interrelations. Proceeding of the *I International Conference on Multidisciplinary Information Sciences & Technologies*, October, 25-28th, Merida, Spain.

Stibel, J.M. 2005. Mental models and online consumer behavior. *Behaviour & Information Technology* 25 (20): 147-150.

Teo, T.S.H., and Y.D. Yeong. 2003. Assessing the consumer decision process in the digital marketplace. *The International Journal of Management Science* 31: 349-363.

Wong, P. K. 2003. Global and national factors affecting e-commerce diffusion in Singapore. *The Information Society* 19:19-32.