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The Impact of Interface Quality on Trust in Web Retailers

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The Impact of Interface Quality on Trust in Web Retailers*

Marie-Christine Roy[†], Olivier Dewit[‡], Benoit A. Aubert[§]

Résumé / Abstract

Le manque de confiance constitue une des barrières les plus importantes à l'adoption et au développement du commerce électronique. Centré sur le commerce électronique de détail, ce travail présente un modèle permettant d'analyser le développement de la confiance du consommateur en fonction des caractéristiques de ce dernier – sa propension – et de la perception qu'il a de certaines caractéristiques du commerçant, soit l'intégrité, l'habileté et la bienveillance de ce dernier. L'utilisabilité de l'interface graphique a été retenue comme étant le facteur-clé en ce qui concerne la perception de ces caractéristiques. Le rôle de chacune des dimensions composant l'utilisabilité a donc été étudié et mis en évidence relativement à la confiance développée par le consommateur.

Web retailing is expected to grow at aggressive rates in future years. One of the most important factors that is slowing down this growth is the lack of trust of potential customers. So, as transactions through the internet develop and mature, success will largely be dependent on gaining and maintaining this trust. It has been suggested that the quality of the user interface of the Web site is a determinant of the initial establishment of trust. In this article, we describe a study where 66 subjects were asked to perform some predefined book purchasing task in a series of sites with varying interface quality. We found a strong relationship between interface quality and trust. We also found some components of user interface quality to be more important than others and discuss the implications for Web site design.

Mots Clés : Interface utilisateur, expérimentation en laboratoire, confiance, b2c, commerce électronique (détail), design de site web

Keywords: User interface, laboratory experiment, trust, usability, electronic retailing, web design

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1. Introduction

Electronic commerce, which can be defined as “the use of an electronic network to simplify and accelerate the stages in the business process” (DTI, 1999) is expected to grow at aggressive rates through 2004 and to make fundamental changes in the way organisations do business. E-commerce provides new business opportunities, reduces costs, facilitates exchanges with business partners and customers (Gartner Group, 2000). In spite of the important business opportunities provided by E-commerce, many factors still impede its development. According to Dinnie (1999), these factors are the lack of proper security mechanisms, inappropriate use of technology, difficulties in estimating cost-benefit ratios for the investment and the lack of customer support for the new applications. From the customer’s point of view, many studies (such as Furnell & Karweni, 1999) have shown they lack confidence in the security of transactions, are concerned about the confidentiality of their personal information and mistrust the partner-supplier. Technological advances have permitted many improvements in terms of insuring higher levels of security. But establishing trust in trading partners still remains a major hurdle that restricts how they interact and do business electronically (Ratnasingham, 1998).

It has been suggested that elements of human computer interface design have a significant influence on customer attitudes and perceptions of the trustworthiness of a supplier (Kim & Moon, 1998, Cheskin Research, 2000, Nielsen & Norman, 2000, Egger, 2000). The objective of this paper is to present a study that tested the relationship between the quality or usability of the interface design and the level of trust of potential customers. We limit our analysis to “business-to-consumer” applications and more specifically to retailing.

In the next section, we review the relevant literature on the concept of trust and site usability. Then we describe a study in which subjects were asked to perform a simulated transaction (book search and purchase) in a sample of bookstore sites varying in design quality. We conclude with recommendations for site designers as to what interface elements are important to establish trust in customers and to increase electronic transaction potential.

2. Trust and Site Usability

For any type of business transaction, be it electronic or traditional, trust between parties is most often critical for a successful outcome and to establish a long term business relationship. The role of trust is even more important in electronic transactions because:

- business partners often do not know each other;
- there is less control over data during their transfer;
- the partners may be located in different or even in unknown locations, where rules and regulations may vary. (Furnell & Karweni, 1999)

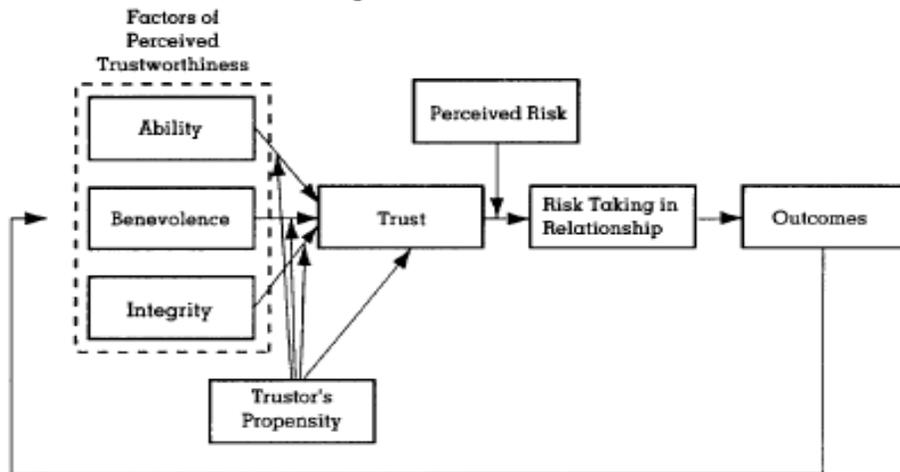
The concept of trust has been widely studied by researchers in many areas such as psychology, sociology, history and political science. However, it remains a difficult concept to define because of its dynamic, evolving and multi-facet nature (Lewicki & Bunker, 1996). For the purpose of

the present study, we adopted the definition provided by Mayer and al. (1995), “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action to the trustor, irrespective of the ability to monitor or control that other party”.

For “business-to-consumer” applications, trust between parties is established very differently from “business-to-business” environments because the relationship is often very short term and more “transaction” focused. Trust is also more difficult to install when there is no pre-existing institutional confidence (Saminathan and al., 1999, Salam and al., 1998). For instance, a study performed by IBM (1999) showed that 77% of American consumers declared themselves to be confident regarding the confidentiality of the information transmitted to their banks whereas the percentage goes down to 21% when information is transmitted for on-line purchasing.

Some studies have been performed to understand trust and buying behaviour of on-line shoppers. Ambrose and Johnson (1998) proposed a model in which two main factors affect customer confidence, the customer’s characteristics (such as need, capacity and willingness) and seller’s characteristics (ability, benevolence, integrity). Their model is based, in part, on the one previously proposed by Mayer and al. (1995, Figure 1). Both theoretical models are unidirectional in describing the trust relationship, i.e. it does not consider reciprocity. This is well adapted to electronic retailing, since the confidence of the seller is not an issue. The seller does not have to trust the consumer. The latter will give its credit card number, which will be checked, before any material is shipped. The seller does not take any risk.

FIGURE 1
Proposed Model of Trust



Model of trust proposed by Mayer, Davis and Schoorman (1995), pp 715.

The model depicted in figure 1 shows four concepts composing trust:

- **Propensity:** Characterizes an individual's general predisposition and desire to be trusting in relationships with others. Propensity depends mainly on past experience, personality and culture (Hofstede, 1980);
- **Ability:** Refers to the competencies and characteristics of the (seller) organization that permits it to have a certain influence and authority in a specific area.
- **Benevolence:** Is related to the willingness to establish mutually satisfying exchanges rather than to simply seek profit maximization;
- **Integrity:** Depends on the principles applied by the organization such as maintaining confidentiality of information.

Trust is also a dynamic concept, as it evolves through time. Individuals will form initial perceptions of the seller and change their perceptions with further information or experience. In our research, we focus primarily on the first interaction between seller and customer and how the initial perception can be influenced by the web site interface. This initial trust is critical. If trust is established and the transaction conducted successfully, trust should be reinforced and subsequent transactions will be conducted with a higher level of trust.

Some previous research has shown the impact of Web site design on the customer's initial perception of the company. Kim and Moon (1998), for instance, performed a study where the manipulation of different interface design factors could induce customer confidence. Their results were limited, however, to banking transactions and to the visual characteristics of the interface. More recent studies (Cheskin Research, 2000, Cheskin Research and Studio Archetype, 1999, Rhodes, 1998) suggested that other interface elements were important to establish trust: The ease of navigation and feed-back mechanisms. Nielsen and Norman (2000) also emphasize the importance of "usability" in web sites. Finally, Egger (2000) proposed a model of customer trust in on-line transactions. Interface issues such as usability, attractiveness and perception appear as important determinants of trust in this model.

3. Research Model and Hypothesis

The objective of our study was to empirically examine the relationship between customer trust and site usability. Our general hypothesis is stated as follows:

H1: Site usability has a positive impact on the perceived trustworthiness of the supplier.

According to Nielsen (1994) usability refers to:

- The ease of learning how to use the interface
- The efficiency of the interface design

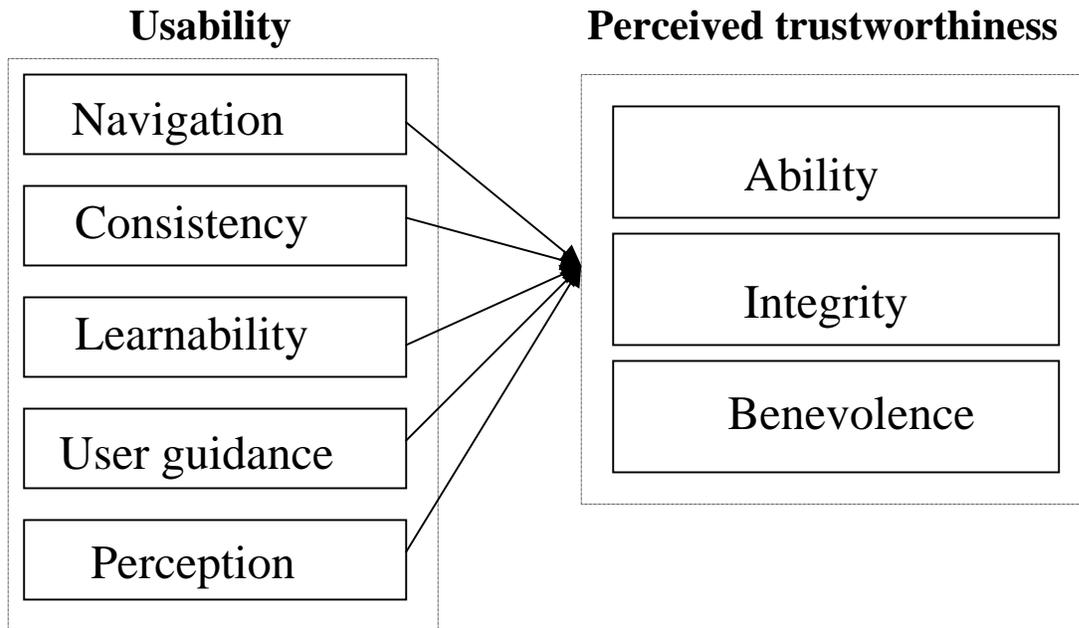
- The ease to memorize how to use the interface
- The reduction of errors
- General satisfaction with the interface

The dimensions proposed by Nielsen were latter integrated into a general index of usability by Lin and al. (1997). We selected the concepts from the Lin and al. questionnaire that were most relevant for first time users of a Web site (the general usability index was designed for all types of applications). Also factors such as minimal action, memory load, flexibility and compatibility were not included in our study because we chose to use those factors which were easier to evaluate after a few minutes of use and applicable to the WEB environment. We also used the concept “ease of navigation” because it was previously put forth as an important determinant of trust (Cheskin Research, 2000). The set of factors evaluated is:

- Ease of navigation: Ease of finding what you want and knowing where you are in the Web site.
- Consistency: In human-computer interaction, consistency is recognized to be able to improve user performance and user satisfaction. It applies internally to the web site and externally to other websites through standards and conventions.
- Learnability: A well-designed interface should be easy to learn. This is achieved through the use of simple and clear language, meaningful display and logical grouping
- Perceptual limitation (perception): A good interface design should embed the considerations of human perceptual organization limitations.
- User guidance or support: A good user guidance scheme will improve learnability and decrease the mental workload.

Our research model proposes a link between these concepts of usability and the factors of perceived trustworthiness proposed by Mayer and al. (1995).

FIGURE 2: Research model



4. Methodology

An experiment was conducted to evaluate the model. Subjects experienced different web sites and data was subsequently collected to evaluate the interface characteristics of the site and the level of trust developed in the E-retailer.

4.1 Measurement

A questionnaire was used to collect data on user evaluation of site usability and trust. The first part of the questionnaire was designed to collect general demographic information and to evaluate the subject's previous internet experience. The second part contained 46 questions based on a five point Likert scale. 29 questions were dedicated to evaluating site usability and were adapted from the index of usability previously developed and validated by Lin and al. (1997). The remaining 17 questions related to perceived trustworthiness and were borrowed and adapted from the questionnaire used by Mayer and al. (1995) (see Appendix).

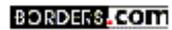
4.2 Web Sites

In order to isolate the impact of varying usability quality, we needed to use sites that offered similar products and transactions. We also needed to find an application that was easily accessible and understandable for our subjects because they were using the sites for the first time. We therefore chose to use bookstore sites. We identified through Bestbookbuys.com 16 potential bookstore websites; Amazon.com and Barnes&Noble.com we then eliminated due to

their high popularity. Their names are well recognized and this would have biased the trust evaluation. Next, we performed a test of the 14 web sites with 5 users (Nielsen, 2000) to evaluate the general usability of their interface. 9 of the sites were selected because they offered some variations in terms of their quality of navigation, consistency and perception. The sites are the following:



<http://www.1bookstreet.com>



<http://www.borders.com>



<http://www.classbook.com>



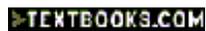
<http://www.ecampus.com>



<http://www.fatbrain.com>



<http://www.page1book.com>



<http://www.textbooks.com>



<http://www.thebigstore.com>



<http://www.varsitybooks.com>

4.3 Subjects and Procedure

Sixty-six (66) subjects participated in the study. 35 were students in the undergraduate business program and received class credit for their participation. The remaining 31 were university personnel which volunteered after receiving an e-mail invitation to participate.

Participants first filled out the questionnaire about general demographics and experience. Then they were randomly provided with either one (for volunteers) or four (for students) sites to try out and evaluate. In each bookstore site, the subjects were asked to perform three tasks: Find a predefined book, then a book of their choice, and simulate the order process of these books up to

the payment operation. Subsequently, they were asked to fill out the second part of the questionnaire pertaining to usability and trust.

Since a group of our subjects performed the task with four different sites, the total number of questionnaires collected was 171.

5. Results

5.1 Demographic Characteristics of the Respondents

The main characteristics of the 66 respondents are presented in Table 1.

Variable	(%)	Variable	(%)
Sex		Occupation	
female	48.5	Computer specialist	3.0
male	51.5	Manager	7.6
Age		Professional	9.1
Less than 20 years	4.5	Teacher or student	72.7
between 20 and 24 years	50.0	other	7.6
between 25 and 29 years	24.2	Annual Income	
between 30 and 34 years	10.5	Less than 25,000\$	67.7
between 35 and 39 years	1.5	between 25,000 and 49,999\$	12.3
between 40 and 44 years	0.0	between 50,000 and 74,999\$	10.8
More than 45 years	9.0	between 75,000 and 99,999\$	4.6
Education		More than 100,000\$	4.6
High school and college	63.7		
Graduate degree	31.8		
others	4.5		

Table 1: Demographic characteristics

Our sample was therefore composed of 66 respondents distributed about equally in both sexes. The average age is 27.8 years. 72.7% are in the academic area, as students or professors. All of them have some experience with the Internet while most own a computer. We also note that 31.8% of them had previously purchased online and 53% would not be willing to provide their

credit card number through the Internet. However, 82% think that making purchases on the Internet would simplify their lives.

Table 2 describes the subjects' level of experience with the Internet.

Variable	Percentage (%)
Number of years using Internet	
Less than 1 year	7.6
between 1 and 3 years	37.9
More than 3 years	54.5
Use in work or studies (h/week)	
Less than 5 hours	22.7
between 6 and 10 hours	18.2
between 11 and 20 hours	16.7
between 21 and 30 hours	16.7
More than 30 hours	25.8
Use as recreation (h/week)	
Less than 5 hours	62.1
between 6 and 10 hours	15.2
between 11 and 20 hours	9.1
between 21 and 30 hours	10.6
More than 30 hours	3.0
Number of computers owned	
none	7.6
1	50.0
2	30.3
More than 2	12.1

Table 2: Use of Computers and Internet

5.2 Reliability Analysis

PLS (Partial Least Squares) was used to assess the reliability of the measures in addition to the Cronbach's alpha. The Cronbach's alpha evaluates the proportion of variance attributable to the true score of the variable the researcher intends to measure. It reflects the consistency of the

measure and the homogeneity of the items in the scale. PLS evaluates the individual item reliability and presupposes no distribution form (like multi-normality) of the data (Gopal, Bosrom & Chin, 1992). As described in Aubert and al. (1996), PLS is recommended to evaluate the loadings of each item with its construct. These loadings should be higher than 0.5 (and ideally higher than 0.707) following the criterion indicated by Rivard and Huff (1988) to indicate that significant variance is shared between each item and the construct. In this study, the items that did not match the 0.5 criterion were dropped.

Table 3 presents the Cronbach's alphas of all variables with the loadings of the various items on their respective constructs. Results show very good reliability for most of the measures. All the dependent variables have very good alphas, and all the corresponding items but one show loadings higher than the stringent criteria of 0.707. The independent variables also demonstrate adequate reliability. Ease of learning and perception have strong alphas (over 0.8) and all their items have loadings above 0.75. Ease of navigation and Consistency also show strong alpha (over 0.8) and most of their items have loadings above 0.707. The support variable is the only one presenting less than perfect reliability, although it can still be considered acceptable. The Cronbach's alpha is 0.57 and half of the items are over the 0.707 criterion. The others are still over the 0.5 limit, as all of our items are.

Table 3 : Reliability Analysis

Variable	Cronbach's alpha	Corresponding Items	Loadings
Perceived Ability	0.92	Qc1	0.8532
		Qc2	0.7389
		Qc3	0.8513
		Qc4	0.8603
		Qc5	0.8493
		Qc6	0.8824
Perceived Benevolence	0.90	Qc7	0.9010
		Qc8	0.9140
		Qc9	0.6375
		Qc10	0.9031
		Qc11	0.8504
Perceived Integrity	0.86	Qc12	0.7168
		Qc13	0.7727
		Qc14	0.8610
		Qc16	0.8183
		Qc17	0.8296
Ease of Navigation	0.85	Qi1	0.6250
		Qi3	0.5073
		Qi4	0.5773
		Qi5	0.7784
		Qi6	0.7638

Variable	Cronbach's alpha	Corresponding Items	Loadings
		Qi7	0.5444
		Qi8	0.8565
		Qi9	0.6902
		Qi10	0.7132
Consistency	0.83	Qi11	0.6928
		Qi12	0.7896
		Qi13	0.8319
		Qi14	0.8337
		Qi15	0.7342
Ease of Learning	0.88	Qi16	0.7660
		Qi17	0.8423
		Qi18	0.8702
		Qi19	0.8735
		Qi20	0.7518
Perception	0.83	Qi22	0.7799
		Qi23	0.7759
		Qi24	0.8459
		Qi25	0.8663
Support	0.57	Qi26	0.6380
		Qi27	0.5045
		Qi28	0.7296
		Qi29	0.7448

To evaluate the influence of the site usability on the perceived trustworthiness of the supplier, three PLS models were used, one for each of the trustworthiness dimensions. Instead of simply aggregating measurement error in a residual error term, PLS simultaneously evaluates both the measurement model and the theoretical model and adjusts the relationships among the variables accordingly (Fornell, 1984). The required sample size for analysis is 10 times the number of items in the largest construct. Five times the largest construct is considered adequate but less stringent (Gopal, Bosrom and Chin, 1992). In this research, the largest construct is the ease of navigation, with ten items. The sample (172 cases) was therefore deemed adequate. It exceeds the 10 to 1 ratio for all the constructs.

5.3 Results

Three different models were tested. Each one has the same independent variables, which are the five components of usability (ease of navigation, consistency, ease of learning, perception and Support). Each of the three model tests a the influence of these independent variables on a different dependent variable: Perceived Ability, Perceived Benevolence, and Perceived Integrity. These are the three antecedents of Trust. As mentioned earlier, since the experiment was conducted in a laboratory setting, measurement of actual trust was impossible. Only a real-life setting, where subjects would actually decide to give their credit card number or not, would have

provided a valid measure of trust. However, the links between these antecedents and the level of trust is well documented (Mayer and al.,1995, Aubert and Kelsey, 2000 and Jarvenpaa, et al., 1998)

Perceived Ability

Perceived ability is the variable most strongly influenced by the various usability dimensions. Three of these have a significant impact on perceived ability (at the $p < 0.01$ level): ease of navigation, perception and support. Fifty eight percent of the variance of perceived ability is explained by the independent variables, which is very good. The results, presented in Figure 3, support the impact of the web site usability on the perceived ability of the supplier.

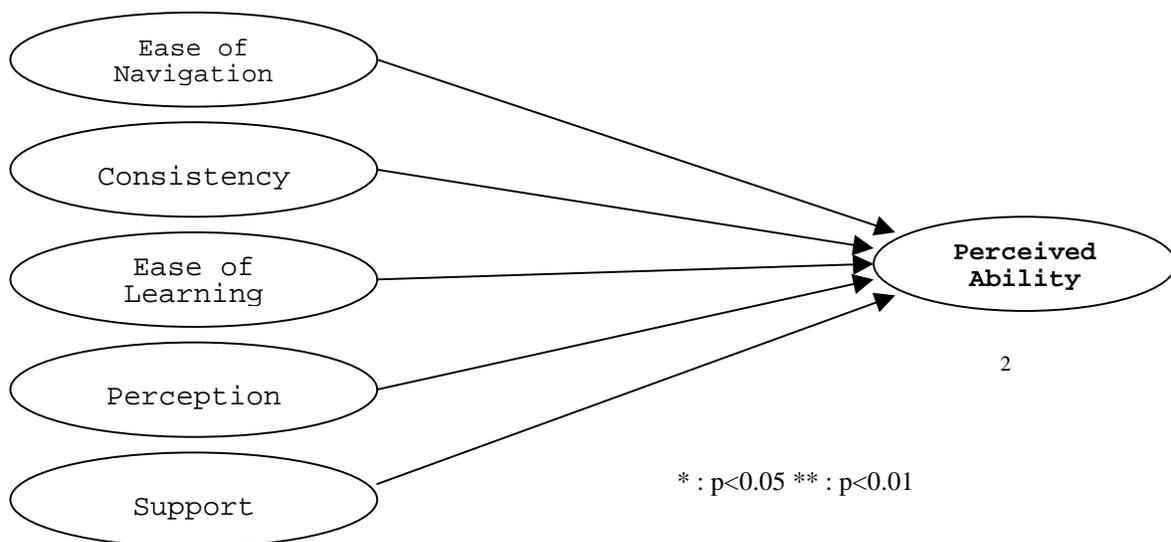


Figure 3. Impact of Usability on Perceived Ability

Perceived Benevolence

The impact of the usability dimensions on the perceived benevolence is also important. The proportion of variance explained in this case is 42% (see Figure 4). In this case all the dimensions, with the exception of Consistency, have a significant influence on the dependent variable ($p < 0.05$). The ease of navigation is significant at the $p < 0.01$ level.

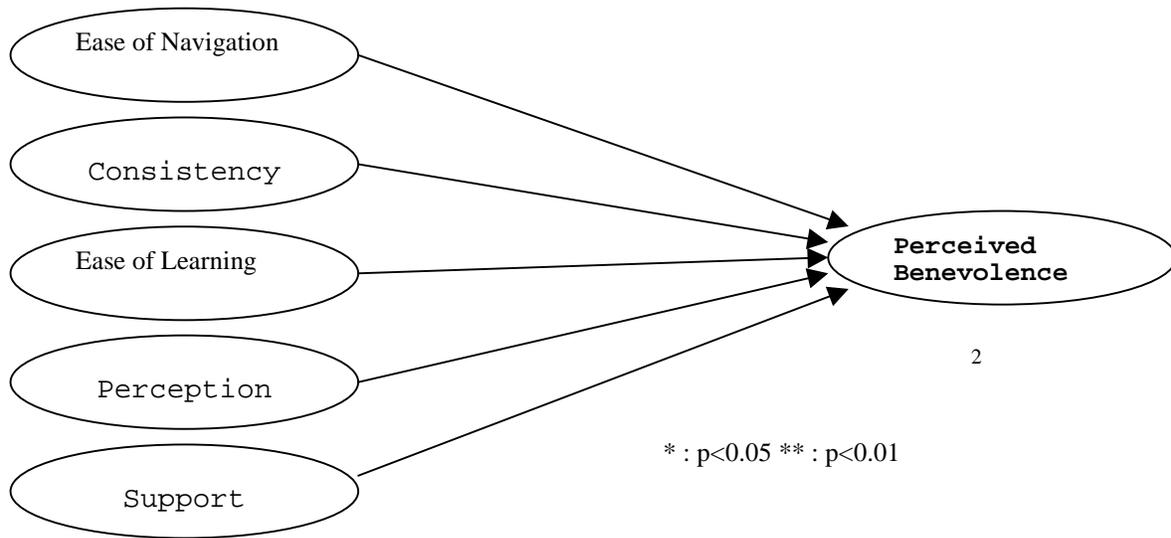


Figure 4. Impact of Usability on Perceived Benevolence

The perceived integrity is the variable which is the least influenced by the components of usability. The overall variance explained in this latter case is lower than in the previous models (28%) and only one component of usability has a significant effect on the perceived integrity: perception of usability (see Figure 5).

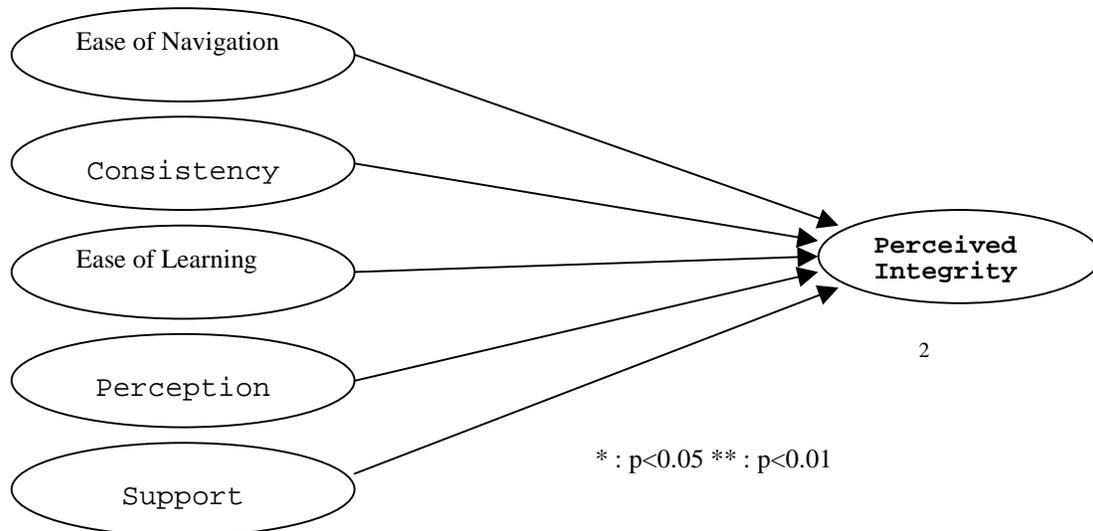


Figure 5. Impact of Usability on Perceived Integrity

6. Discussion

Usability is often mentioned as an important determinant of harmonious and productive online transactions (Donahue and Weinschenk, 1999). The results of this study show that it is also important in order to establish a favourable perception of the vendor. Globally, we found four usability factors out of the five measured to be significantly related to the trustworthiness of the vendor. We can therefore conclude that, as we hypothesized, the general usability of a Web site has an impact on the establishment of trust. Only consistency did not appear to impact the factors that determine trust. Although consistency is important for general usability, it is possible that users are not as sensitive or critical about this issue. Consistency might increase the usability of the web site without affecting the level of trust.

The usability factors were related most strongly to perceived ability (when the explained variance is considered), which is defined as the competencies and authority of the seller. This is interesting since in an electronic commerce environment, ability will certainly weigh heavily on the willingness to establish a business relationship, particularly when the vendor must be trusted to deliver a quality product or service. Three of the five factors of usability, ease of navigation, perception and support, were significantly related to perceived ability. This is intuitively the most natural link to understand. Competence and authority in a given field should translate into competence in designing a web site appropriate for the given field. Therefore, it is not surprising that respondents inferred perceived ability from the interface characteristics of the web site.

The components of interface quality were good predictors for benevolence (42% of the variance explained). Benevolence was defined as the willingness to establish mutually satisfying exchanges. As it was the case when considering the perceived ability, ease of navigation, perception and support have a significant effect on the dependent variable. Moreover, here we found ease of learning to be a significant factor, whereas it was not significant for ability. We explain this new link by the fact that the vendor may be perceived as more motivated to accommodate the user if it makes the customer's experience with the interface less cognitively demanding. Consequently, this would influence the perception that the vendor is more willing to establish a mutually satisfying relationship.

The model evaluating the effect of usability on perceived integrity was the weakest of the three models. Only one link was significant (the one between perception and perceived integrity) and the variance explained was 28%. This leads to two main observations. Since this factor (perception) was the only one to be significant for all three antecedents of trust, we may conclude that it is also the most important determinant of trust. Since the concept of perception relates more to the general presentation and design of the web site, it is probably the factor that will have the most impact the first impression of the users (one question for this concept was "generally I like the design of this web site").

Also, since the characteristics of the web interface seemed to have a weaker impact on the perceived integrity, it suggests that other elements influence perceived integrity. It might be the most difficult antecedent of trust to assess in a virtual transaction. This would explain why many E-retailer are investing vast amounts of money in traditional advertising campaigns. This creates

brand recognition. A brand name is an irreversible investment and can serve as a bond to guarantee a transaction (Klein and Leffler, 1981). This is also a good explanation for the results of the IBM (1999) study uncovering the extreme gap between the levels of confidence American consumers feel when interacting with their bank versus when interacting with other on-line parties. Banks have traditionally made huge investments in brand name and reputation. This might be why consumers have such high levels of confidence when interacting with the banks.

Overall, we found that some factors of usability are more important than others in an on-line transaction. Consistency, for instance, never appeared to play a significant role on the user's perception of the vendor. Although consistency has been shown to be an important factor in interface quality and should not be excluded as a quality criteria, on-line vendors should pay particular attention to the issues of ease of navigation, ease of learning, perception and support when designing their Web sites, or if they observe some difficulties related to trust by their potential clients.

Limitations and Avenues for Future Research

Since we did not measure overall trust and did not require that our subjects decide if they were willing or not to go through with the online transaction, it was not possible to evaluate the weight or impact the three components or antecedents of trust have on this decision. Consequently, it was also difficult to predict how heavily the usability factors will impact on the willingness to perform the transaction. Future research is needed to measure this link and to more specifically pinpoint the critical areas of usability that vendors must pay attention to. However, the results of this study offer support for the idea that usability is an important determinant to establish trust in a client over the Web.

Future research is also needed to identify other interface factors that may impact vendor trustworthiness or image, such as the general appearance of the site, the use of graphics, attractiveness, playfulness, information quality, support, etc. It is probable that the general look of a site will deter trustworthiness in the vendor even though the general usability of the site is good. It will also be interesting to investigate how these factors weigh compared to usability on trust.

This study suffers from a number of limitations. First, we could not eliminate the possibility that usability and trust are both influenced by a third component, for instance the general look of the site (colour, graphics, display). Second, a large portion of our sample was composed of university students. It is possible that their perceptions of trustworthiness are different from other populations because they are younger and have less experience as consumers (although no significant correlation was found between demographic variables and the experimental variables). Their experience of the Web may also be quite different and lead them to emphasize different factors (such as general appearance). More research is needed to study the differences between the categories of clients (age, culture, experience, etc.) of online shopping, so design strategies may be more focussed on the target market.

The lower percentage of variance explained for perceived integrity also warrants more research on the importance of brand recognition and reputation in E-commerce transactions and on the use of advertising as a way to build such reputation through irreversible investments. The two million dollars ad of E-Trade during the 2000 Super Bowl would serve such a purpose.

References

- Ambrose P. J. and Johnson, G. J. (1998), "A Trust Based Model of Buying Behaviour in Electronic Retailing", *Association for Information Systems*, 1998 Americas Conference Proceedings: <http://www.isworld.org/ais.ac.98/proceedings/ec.htm>
- Aubert, B. A., Kelsey, B.L. (2000), "The illusion of trust and performance", Proceedings of Administrative Science Association of Canada Conference, vol. 21, no. 4.
- Cheskin Research (2000), "Trust in the wired Americas", Obtained on the Internet July 2000.: <http://www.cheskin.com/think/studies/trust2.html>
- Cheskin Research and Studio Archetype (1999), "eCommerce Trust Study", Obtained on the Internet January 1999. <http://www.studioarchetype.com/cheskin/index.html>
- Dinnie, G. (1999), "The Second Annual Global Information Security Survey", *Information Management & Computer Security*, Vol. 7 No.3, pp. 112-120.
- Donahue, G. M., Weinschenk, S. Nowicki, J. (1999), "Usability is good business", Compuware Corporation Research Report, <http://www.compuware.com/intelligence/articles/usability.htm>.
- DTI (1999), "Building confidence in electronic commerce – a consultation document", Department of Trade & Industry. Document reference URN 99/642.
- Egger, F. N. (2000), "Trust me, I'm an Online Vendor: Towards a Model of Trust for E-Commerce System Design", Obtained on the Internet April 2000. <http://www.ip0.tue.nl/homepages/fegger/publications.htm>
- Ernst&Young (1999), "eBusiness Trust Survey". Obtained on the Internet February 7 2000: http://www.ey.com/global/gcr.nsf/US/eBusiness_Trust_Survey_-_eBusiness_-_Ernst_&_Young_LL
- Fornell, C., (1984) "A second generation of multivariate analysis: Classification of methods and implications for marketing research", **Working Paper**, April, 62.
- Furnell, S. M. and Karweni, T. (1999), "Security implications of electronic commerce: a survey of consumers and businesses", *Internet research*, Vol. 9 No. 5, pp. 372-382.
- GartnerGroup (2000), "E-Markand Makers to be Key Driver of Business-to-Business Segment", January Obtained on the Internet February 2nd 2000: <http://www.gartner.com/>.

- Gopal, A., Bosrom, R., Chin, W. (1992), "Applying adaptive structuration theory to investigate the process of group support systems use", *Journal of Management Information Systems*, 9, 3.
- Hofstede, G. (1980), "Motivation, leadership and organization: Do American theories apply abroad?", *Organizational Dynamics*, Vol. 9 No. 1, pp. 42-63.
- IBM (1999), "IBM Multi-National Consumer Privacy Survey: A comprehensive and comparative look at consumers in the United States, Germany and United Kingdom and their attitudes toward privacy in everyday business transactions". Obtained on the Internet February 7th 2000: <http://www.ibm.com/services/e-business/priwksshop.html>
- Jarvenpaa, S. L, Knoll, K., Leidner, D.E. (1998), "Is anybody out there? Antecedents of trust in global virtual teams", *Journal of Management Information Systems*, 14, 29-65.
- Jarvenpaa, S. L. and Tractinsky, N. (1999), "Consumer Trust in an Internet Store: A Cross-Cultural Validation", *Journal of Computer Mediated Communication*, Vol.5 No.2. Obtained on the Internet February 2nd 2000: <http://www.ascusc.org/jcmc/vol5/issue2/swaminathan.htm>
- Kim, J. and Moon, J. Y. (1998), "Designing towards Emotional Usability in Customer Interfaces – Trustworthiness of Cyber-Banking System Interfaces", *Interacting with Computers*, Vol. 10 No. 1, pp. 1-29.
- Klein, Benjamin, Leffler, Keith B., "The Role of Market Forces in Assuring Contractual Performance", *Journal of Political Economy*, vol. 89, no 4, (1981) 615-641.
- Lewicki, R.J. and Bunker, B. B. (1996), "Developing and maintaining trust in work relationships", in Kramer, R. M. and Tyler, T. R. (Eds), *Trust in Organizations: Frontiers of Theory and Research*, Sage, Thousand Oaks, CA.
- Lin, H. X., Choong, Y.-Y. and Salvendy, G. (1997), "A Proposed Index of Usability: A Method for Comparing the Relative Usability of Different Software Systems", *Behaviour and Information Technology*, Vol. 16 No. 4, pp. 267-278.
- Mayer, R. C., Davis, J. H. and Schoorman, F. D. (1995), "An Integrative Model of Organizational Trust", *Academy of Management Review*, Vol. 20 No. 3, pp. 709-734.
- Mayer, R. C. and Davis, J. H. (1999), "The effect of the performance appraisal system on trust for management: a field quasi-experiment", *Journal of applied psychology*, Vol. 84 No. 1, pp. 123-136.
- Nielsen, J. (1994), "Usability engineering", published by Morgan Kaufmann, San-Francisco, 1994.
- Nielsen, J. (2000), "Why you only need to test with 5 users", Mars 2000. Obtained on the Internet May 5th 2000: <http://www.useit.com/alertbox/20000319.html>
- Nielsen, J. and Norman D. A. (2000), "Usability on the Web isn't a luxury", Janvier 2000 Obtained on the Internet March 6th 2000:

<http://www.informationweek.com/773/web.htm>

- Ratnasingham, P. (1998), "The importance of trust in electronic commerce", *Internet research*, Vol. 8 No. 4, pp. 313-321.
- Rhodes, J. S. (1998), "How to Gain the Trust of your Users", September 1998. Obtained on the Internet March 6th 2000: <http://webword.com/moving/trust.html>
- Rivard, Suzanne, Huff, Sid, "Factors of Success for End User Computing", *Communications of the ACM*, vol. 31, no. 5, (May 1988) 552-561.
- Salam, A. F., Rao, H. R. and Pegel, C. C. (1998), "An Investigation of Consumer-perceived Risk on Electronic Commerce Transactions: The Role of Institutional Trust and Economic Incentive in a Social Exchange Framework", *Association for Information Systems*, 1998 Americas Conference Proceedings. Obtained on the Internet February 6th 2000: <http://www.isworld.org/ais.ac.98/proceedings/ec.htm>
- Swaminathan, V., Lepkowska-White, E. and Rao, B. P. (1999), "Browsers or Buyers in Cyberspace? An Investigation of Factors Influencing Electronic Exchange", *Journal of Computer Mediated Communication*, Vol.5 No.2. Obtained on the Internet February 2nd 2000: <http://www.ascusc.org/jcmc/vol5/issue2/swaminathan.htm>
- US Department of Commerce (1999), "The Emerging digital economy II". Obtained on the Internet February 2nd 2000: <http://www.ecommerce.gov/ede/>.

Interface

1.	Considering the home page of this site, I understand clearly what is its goal.
2.	Considering the home page of this site, I understand clearly what can be done.
3.	The home page of this site is easily accessible from any interior pages.
4.	Each page of this site is clearly identified by the same logo.
5.	I always know where I am relatively to the site structure.
6.	I always know where I can go.
7.	I am always able to go back easily to the pages that I had previously visited.
8.	The structure of this site seems logical to me
9.	I can find easily what I am looking for on this site.
10.	The search engine is always accessible.
11.	The assignment of colour codes is conventional.
12.	The coding is consistent across displays, menu options.
13.	The display format is consistent.
14.	The wording is consistent across displays.
15.	Symbols for graphic data are standard.
16.	It provides clarity of wording.
17.	The data grouping is reasonable for easy learning.
18.	The grouping of menu options is logical.
19.	The ordering of menu options is logical.
20.	The command names are meaningful
21.	It provides easily distinguished colours.
22.	The screen density is reasonable.
23.	Menus are distinct from other displayed information.
24.	Groups of information are well demarcated.
25.	I like the design of this site.
26.	Error messages are clear and useful.
27.	It always provides CANCEL option.
28.	HELP is always provided.

Trusworthiness

- | |
|--|
| 1. This seller is very capable of performing its job. |
| 2. This seller is known to be successful at the things it tries to do. |
| 3. This seller has much knowledge about the work that needs done. |
| 4. I feel very confident about this seller's skills. |
| 5. This seller has specialized capabilities that can increase its performance. |
| 6. This seller is well qualified. |
| 7. This seller is very concerned about my welfare. |
| 8. My needs and desires are very important to this seller. |
| 9. This seller would not knowingly do anything to hurt me. |
| 10. This seller really looks out for what is important to me. |
| 11. This seller will go out of its way to help me. |
| 12. This seller has a strong sense of justice. |
| 13. I never have to wonder whether this seller will stick to its word. |
| 14. This seller tries hard to be fair in dealing with others. |
| 15. This seller's actions and behaviours are not very consistent. |
| 16. I like this seller's values. |
| 17. Sound principles seem to guide this seller's behaviour. |
| 18. One should be very cautious with strangers. |
| 19. Most experts tell the truth about the limits of their knowledge. |
| 20. Most people can be counted on to do what they say they will do. |
| 21. These days, you must be alert or someone is likely to take advantage of you. |
| 22. Most salespeople are honest in describing their products. |
| 23. Most repair people will not overcharge people who are ignorant of their speciality |
| 24. Most people answer public opinion polls honestly. |
| 25. Most adults are competent at their jobs. |

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